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COMPLETE *Finishing* SYSTEMS

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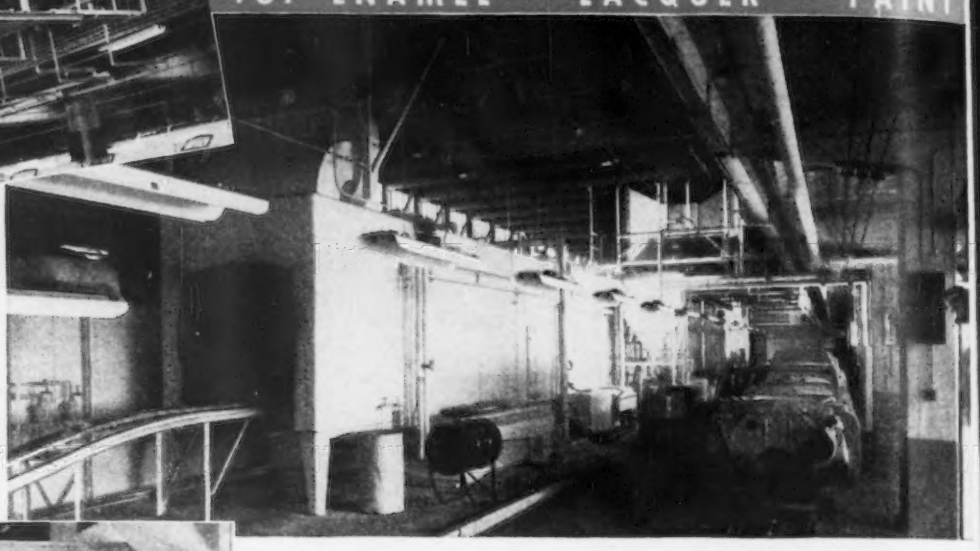
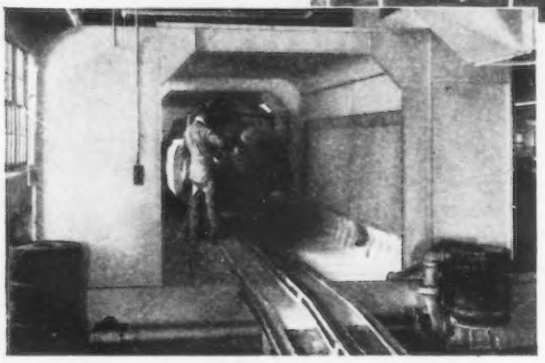
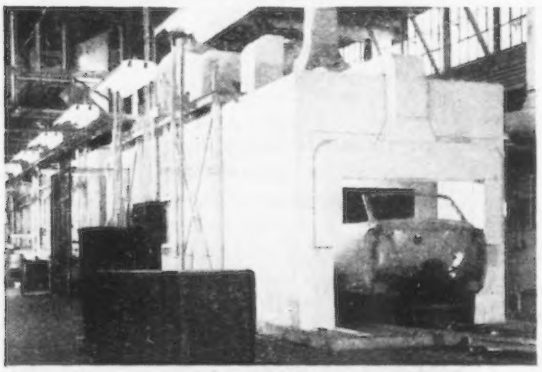


Above: Typical Mahon Filtered Air Supply Units. These Units Supply Clean Filtered Air to the Spray Rooms at Studebaker. At Right: Mahon Metal Cleaning and Rust Proofing Equipment—Part of the Studebaker Installation.



Studebaker Bodies Receiving their Fine Finish in Mahon Hydro-Filter Spray Booths.



Studebaker Bodies Emerging from Mahon Tunnel-Type Drying Ovens.

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Illustrations here show major units of a new Complete Finishing System installed by Mahon at Studebaker's South Bend Plant to handle finishing production of new convertible bodies. In the automotive field, as well as the household appliance field, metal furniture field, and many others where fine finishes are imperative, Mahon Finishing Systems predominate. Manufacturers with finishing problems turn naturally to Mahon for equipment to produce the finest finishes . . . they do so because they know that twenty-seven years of experience in this highly specialized field, supplemented by constant research and pioneering development, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available elsewhere. See Mahon's Insert in Sweet's Mechanical Industries File, or, if you are contemplating new finishing equipment in the near future, arrange consultation with Mahon engineers today.

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A Warning

FOR the time being, the gale in the commodity markets has subsided. It has left shock, losses, uncertainty and a cacophony of charge and countercharge at top political levels. During the pause, it may be prudent for those who have not yet been shaken to look at the causes and take stock of the future.

The primary cause of the flight in commodity prices during the second half of 1947 is to be found in a destructive worldwide war, further aggravated by man and nature. The iron curtain dips along a line behind which may be found a preponderance of food production while on the freer side may be found a corresponding emphasis on industrial output. A cleavage between east and west prevented that cooperation which in the past had made possible a mutual exchange of surplus output.

The winter of 1946-47 was one of the worst in the experience of Europe. Grain crops were disastrously short. Although wheat in this country was a bumper crop, corn was disappointing. Price controls, rationing, questionable schemes of socialization and the constant chivying of the Communists prevented Europe from making the best use of its productive facilities. On top of this an American government attempted to compensate for a major diplomatic error by underwriting European postwar recovery. In the implementation of this program, it bought grain in a manner which can only be described charitably as inept.

During the last two months this picture has changed. The southern hemisphere has had excellent crops. Moisture conditions in Europe are described as ideal, with some estimates suggesting an increase of a half billion bushels of grain over the crop of 1947. Canada and the United States similarly show a promising outlook for the crops of 1948. Russia has made larger commitments for delivery of grain to the west than had been anticipated. Our grain carry-over, it now develops, is substantially greater than a year ago. World import requirements and available supplies on the basis of latest reports are in approximte balance—a contrast to earlier fears of a continuing deficit. Finally our Department of Agriculture, with the exception of a tail-end 77-million bushel requirement, has completed its buying for European account until the next harvest.

Depending upon where one notes the decline, grains have apparently dropped from 20 to 35 per cent. Wholesale food prices, according to the Journal of Commerce have fallen 15%. In a limited but spectacular fashion, these changes have already been reflected in retail prices.

If labor is sincere in its demand for wage adjustments to meet the higher cost of living, relief is already in sight without resort to industrial warfare. The shock in the commodity markets is a grim and unmistakable warning. Other producers, both employer and employee, will be well advised to give this warning solemn heed. Any action at this time tending to increase the cost of non-farm items, either by misguided pressure for higher wages or a desire to protect profit margins, would be inopportune. The crack in the commodity markets has already introduced an evident spirit of caution among all buyers. This is no time to antagonize markets needlessly.

Joseph Stagg Lawrence

He Keeps the Wheels Turning...

HE HELPS keep steel flowing—from Inland to you. He's Stanley Kroll, 32, motor inspector at Inland's Indiana Harbor Plate Mill. An Inland employee since 1935, Stanley helps to keep the wheels turning on the plate mill. He knows the importance of electrical power to full capacity production. He sees to it that the hundreds of plate mill motors —big and small—supply machines with the power they need. Stanley Kroll, motor inspector, is a good example of the thousands of capable, experienced men working together to produce every possible ton of quality Inland Steel.

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► A midwest foundry experimenting with the 5 pct oxygen enrichment of a cupola blast has found the practice badly eroded the lining. In 2 hr of steadily blowing the enriched blast, 10 in. of lining thickness was burned out in the melting zone of the cupola. Ordinarily this foundry runs its cupolas at least 16 hr before any patching is needed in the refractory lining.

► Packaged rolls of Reynolds aluminum foil are being introduced this week in New York retail stores at 39¢ to substitute for the usual household uses for waxed paper. The company points out that it combines the advantages of plastic and paper coverings.

► A New York exporter of communications equipment is peddling ship scrap these days. He obtained the scrap from North African shipbreaking operations, as payment for one of his export deals.

► India is to have two new steel producing units, each with a 500,000 ton capacity, capable of being doubled later. Capital to be required is estimated at $148 million.

► Adaptations and improvements of plating techniques have advanced electroforming to the point where some plating experts believe it can now compete with standard metal forming operations as a mass production process, being found especially efficient for tubular, conical and cuplike shapes. One installation is currently forming over 40,000 small parts per week by this method.

► More and more building products will be made of aluminum judging by the number of manufacturers showing aluminum windows, siding, roofing, enameled tiles and insulation at a recent exposition of building products held in New York. Wood and steel products were conspicuously absent.

► The use of imported Swedish ore in Birmingham furnaces is an outgrowth of the Arabian pipe deals. Raw steel from Geneva was not available to supply U. S. Steel's new cold finishing mill at Pittsburg, Calif., because the Geneva output is tied up on the export pipe deals until 1952. The capacity was available in Birmingham if the ore used there could be "sweetened" with richer ores.

► Twenty-four separate projects for expansion or modernization of Britain's steel industry are scheduled for completion this year. They will add 400,000 tons to production capacity.

► Users of wire recorders are kicking about stiffness of the wire. They'll get more ductility within a year. Meanwhile, the latest advance in this line is a switch to smaller diameter wire, to be available soon on a popular recorder. Spools can hold more wire and there's less tendency for it to jump off.

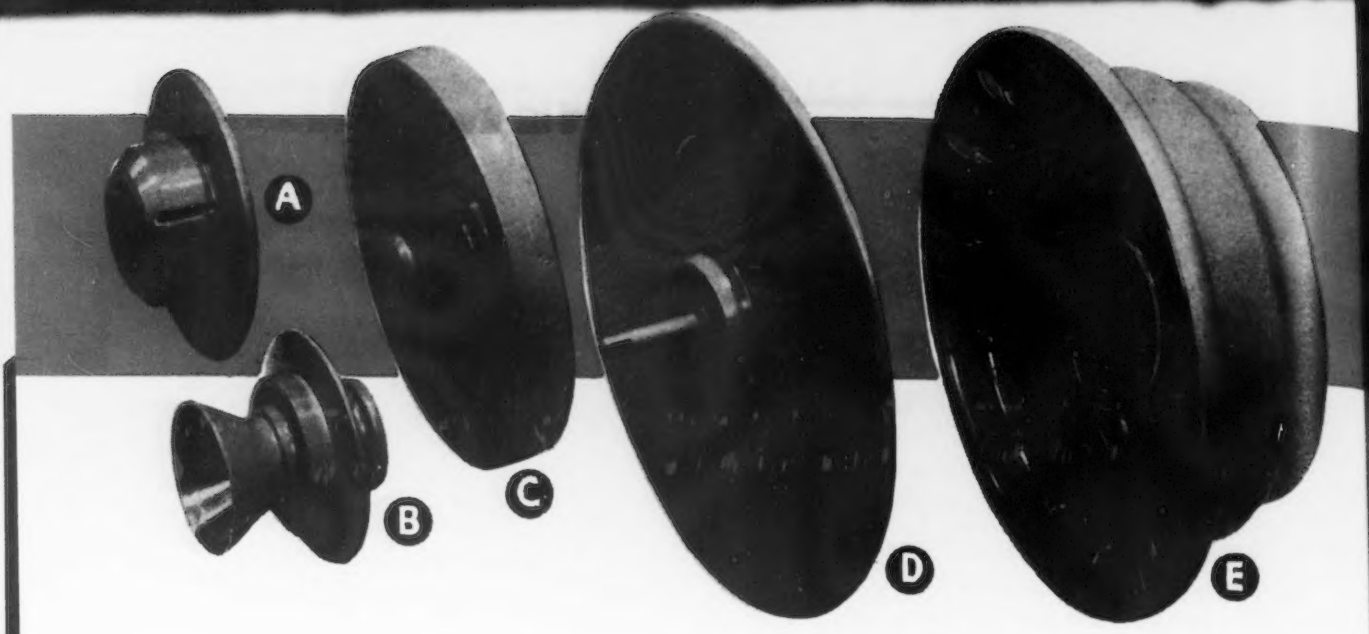
► Two new companies will soon start manufacturing stainless steel beer barrels. In the same field, Alcoa has changed its production to Alclad sheet, making the interior pure aluminum.

► Henry Ford hopes to export about 6000 automobiles from England to the United States during the next 6 months. Mr. Ford told Londoners there is a market in the U. S. for the 8 and 10 hp (British) cars. English Ford broke all previous records in January with 7200 vehicles for export.

► A 20 pct increase in welding rate, high operating efficiency, lower power consumption and complete freedom from arc blow, bode well for the future of ac welding. More suitable electrodes developed in recent years permit greater use of this method. Currently, about 80 pct of arc welding equipment in existence is dc and 20 pct is ac.

► The future of gas turbines in marine propulsion was considerably brightened by the performance of the first test engine on 55 hr sea trial. Power loss due to salt deposition was less than expected and the general state of the blading and chambers was very satisfactory. Further test projects are under way.

► Steel mill engineers have long wanted a mill drive motor with the dimensions mostly in length and very little diameter, so that inertia and speed of response would approach ideal conditions. However, engineers of a large midwestern firm recently admitted that the much desired "stove-pipe" motor cannot be built at the present time.



Diecasting Magnesium

Operations conducted at the plant of Litemetal Dicast, Inc., in the production of a large variety of magnesium diecastings are discussed in this article. Equipment used in this operation, which includes runs of up to 1 million on some parts, is described and some notes are given on injection techniques and die design consideration, involved in successful magnesium diecasting.

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By HERBERT CHASE

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MOST diecasters have shied away from magnesium diecasting since the war or have done it only at customer insistence, chiefly because of difficulties encountered in securing sound castings on a true economical basis. But success with magnesium, as with many other materials considered difficult to process in certain respects, is largely a matter of patience and ability in acquiring and then practicing the right technique.

This has, for example, been the experience of two young engineers, R. C. Cornell and W. A. Kavanaugh who gained experience with magnesium with Dow Chemical Co. and then established Litemetal Dicast, Inc., a division of Hayes Industries, Jackson, Mich. Litemetal now specializes in diecasting both magnesium and aluminum alloys and works with magnesium on about the same cost per casting as for aluminum. In other words, having acquired a good technique for diecasting magnesium, castings are turned out on a sound economical basis and substantially on a par with aluminum.

Moreover, the magnesium diecastings manufactured are produced mostly in large quantities, not merely on a pilot scale. Some typical parts produced in magnesium at this plant are illustrated in fig. 1. The castings shown in fig. 1, which are produced on a commercial basis are as follows: *A* and *B* are flanges of textile bobbins both of which have inserts cast in place; *C* is a lawnmower gear, *D* a bobbin head,

FIG. 1—A group of typical magnesium die-castings being turned out on a production basis. Several parts have cast-in inserts.

E an aircraft wheel, *F* portable saw guards, *G* a fishing rod handle, and *H* parts of a hearing aid. *I* is a saw handle, parts *J* are for a model engine, *K* is a camera part, *L* is an aircraft part, and *M* is a part for a seeding machine; *N* is a textile bobbin; at *O* are binocular parts; *P* a dynamotor end bell, and *Q* is a gear housing.

Although the lightweight of magnesium is an advantage in most applications, some uses are based more particularly on ease and speed of machining, some on resistance to wear and some, especially in the textile field, to less tendency (than aluminum) to discolor delicate filaments with which contact is made. In machining and polishing, magnesium can be given an exceedingly smooth finish, if castings are sound. This too is an asset in contact with fine filaments that are easily broken by any sensible roughness or the finest burr on surfaces such as those of bobbins or spindles.

Although the plant of Litemetal Dicast, Inc., is of modest size, it has attained a high output, and runs on some magnesium jobs have totaled over 1 million pieces. Production rates on these often exceed those for aluminum castings, partly because less heat has to be absorbed in the die and it can be opened sooner, since the freezing rate is high. Casting rates depend upon the size, section thickness and complexity of the casting as well as upon the time required for placing inserts when they are specified, but rates of 50 to 300 shots an hour are reported

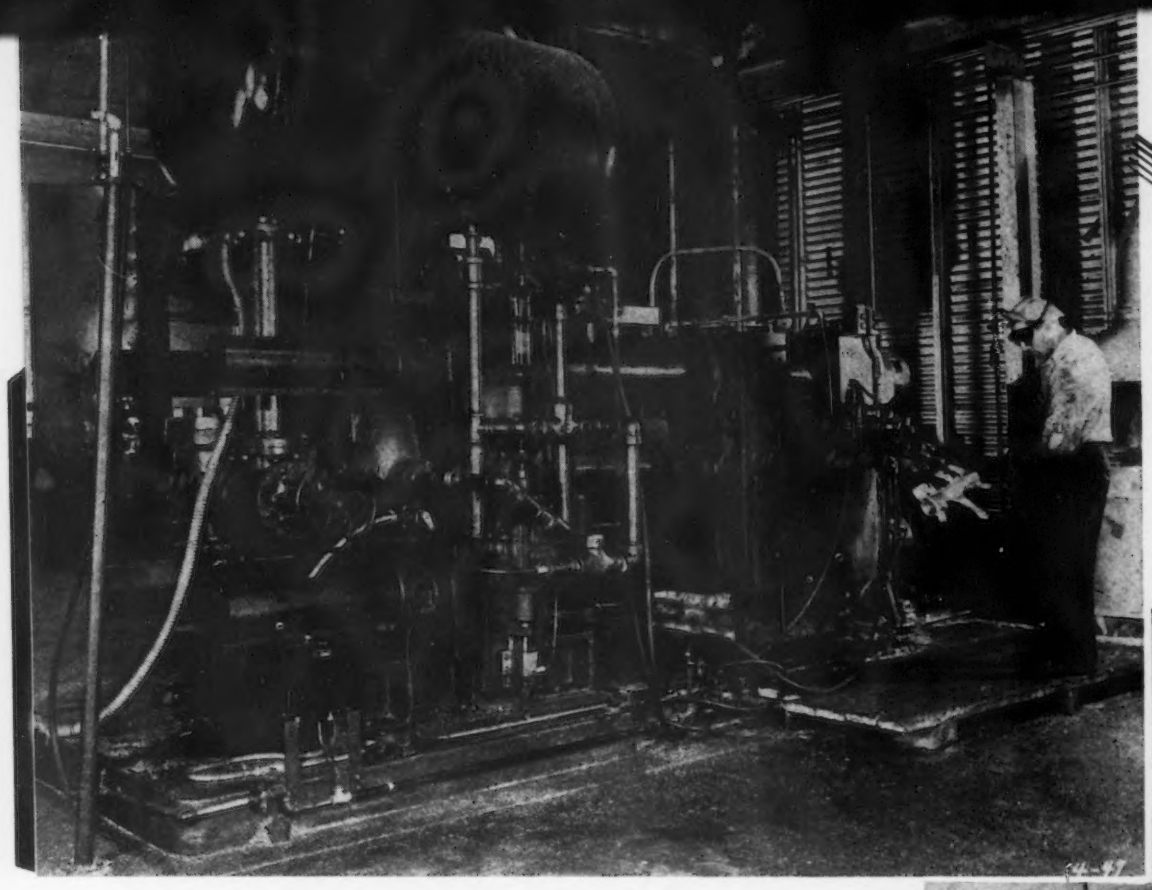


FIG. 3—Largest of the diecasting machines used at Litemetal is this 560-ton all-hydraulic unit.

FIG. 2—Melting room showing the gas-fired melting furnaces at left and a portion of one of the holding furnaces at the right background.

to be attained. Elsewhere, rates of 200 shots an hour are considered very fast in cold chamber machines and are seldom attained in diecasting aluminum.

All melting is done in a separate room, fig. 2, at one end of the plant. Holding furnaces are set into the wall that divides this room from the remainder of the building. This arrangement makes it easy to fill the holding furnaces with molten metal, transferred by ladle from melting furnaces, without carrying this metal into the casting room. In addition, fumes are kept out of the casting room. All biscuits, runners and flash cut from castings and all rejected castings are returned to the melting room to be run down and, of course, virgin ingots are melted and alloying is done in this room.

In the melting room are two 600-lb melting furnaces used alternatively for magnesium or aluminum except that pots are changed as necessary. For aluminum, pots are of cast iron, coated weekly with a clay-graphite wash. Pots for magnesium are of steel construction. Furnaces are gas fired and are equipped with automatic pyrometric controls.

A discussion of the methods used by another plant in the successful production of magnesium diecastings, as well as permanent and semi-permanent mold castings, was given in the article "Casting Magnesium in Metal Molds," THE IRON AGE, Sept. 25, 1947, p. 73.—Ed.

Magnesium melting is done under a flux that also prevents contact of molten metal with air. Where rejected castings that contain inserts are to be remelted, a wire is passed through the insert to recover it for reuse and to prevent dissolving in the molten metal (especially aluminum).

Holding furnaces are also gas fired and have hoods under which a sulfur dioxide atmosphere is maintained when magnesium alloy is being cast, as is common practice in such work. The holding furnaces are not attached to the casting machines but have, at the casting room side, openings for hand ladling into the cold chambers of the machines. All magnesium castings are made from Dowmetal R or ASTM 13.

Any of the conventional aluminum diecasting alloys can be employed but those most used are the standard ASTM alloys.

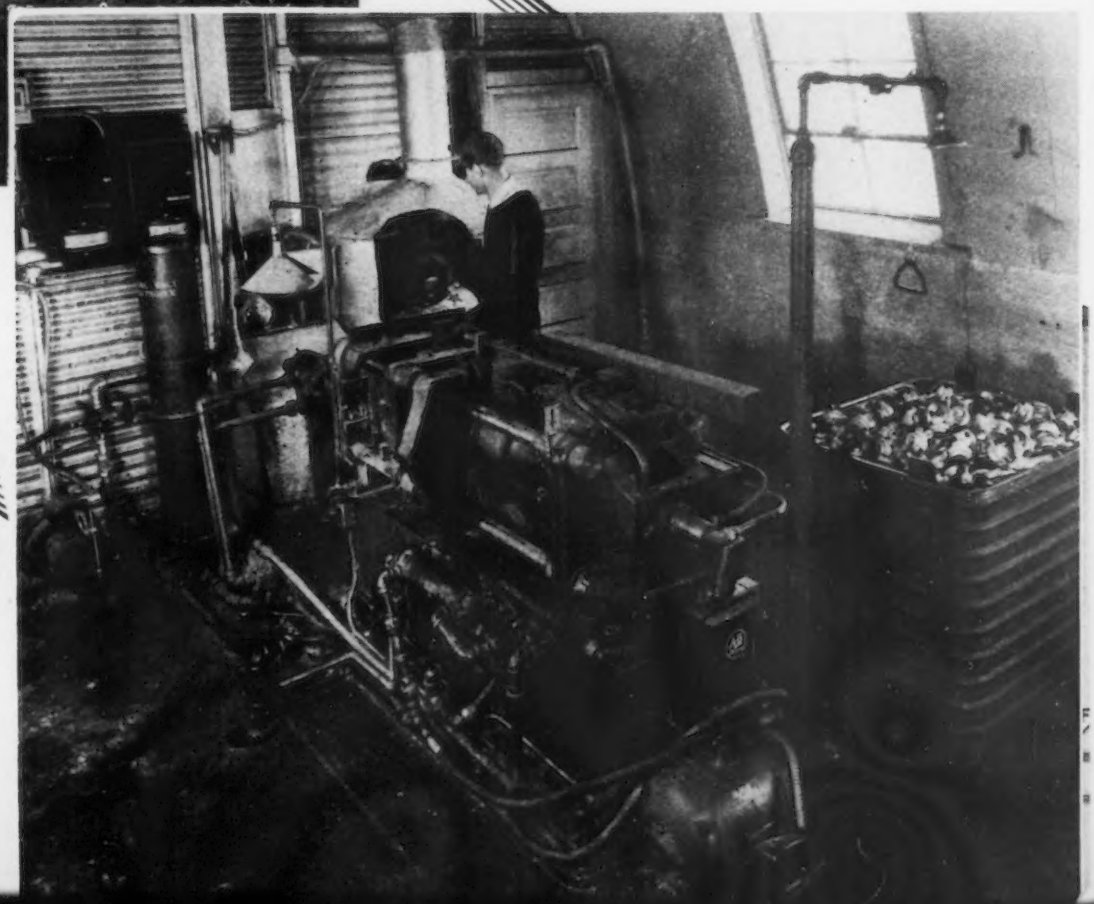
Casting is done either in a 560-ton machine, fig. 3, built by French Oil Mill Machinery Co. to Dow specifications, or in other machines, including the smaller Lester-Phoenix model shown in fig. 4. The larger machine, fig. 3, is all hydraulic and its movable platen is arranged for fast motion at low pressure, 250 psi, from an air loaded accumulator or intensifier tank on top of the machine. Final locking at high pressure and metal injection are controlled by separate pumps that develop 2000 psi and are used in combination with their own accumulator. Despite the large size of this machine, speeds up to 300 shots an hour with magnesium are said to be attained on some castings. Two other machines, one a direct hydraulic Madison-Kipp of 150 tons and a Miller-Taylor toggle machine of about 400 tons, are used for castings of intermediate size.

In the Lester machine, fig. 4, final locking pressure is accomplished by toggles operated hydraulically. There is a separate pump and an accumulator for operating the ram for metal injection.

Much attention is paid both to the speed of injection and to the maximum pressure applied since both affect the soundness of the castings produced. For magnesium, the injection rate is made as slow as will yield sound castings that fill out properly, especially where heavy sections are involved. This helps avoid spraying that tends to produce porosity and castings of inferior finish. Partly to keep metal velocity at gates as low as consistent, gates are made with the maximum area that is feasible and will yield good castings. For castings with thin sections and considerable area, higher injection speeds are necessary as, otherwise, the casting will not fill out properly because of the rapid freezing that occurs.

The final injection pressure generally ranges from 5000 to as high as 45,000 psi, but the higher pressure is applied only where the highest grade of castings is required, partly because the higher pressures limit the size or projected area of casting that can be produced without exceeding the locking pressure and forcing the dies open. To vary the pressure applied to the metal with a given maximum pumping pressure, machines are provided with cold chambers and rams of different diameter, 1½, 2, 2½ or 3 in. The diameter chosen for each die is that known to yield required results.

Some indication of results obtained in this



RIGHT

FIG. 4—This Lester-Phoenix machine, using hydraulically operated locking toggles and high injection pressure, is employed for casting medium-sized parts in either aluminum or magnesium.

operation can be had by referring to the castings shown in fig. 1. Textile bobbin flanges such as that at *A*, fig. 1, have been produced at very high pressures in two-cavity dies, as the bobbins turn at 10,000 rpm and, when machined, can show no porous spots of over 0.007-in. diam and must be of extreme smoothness. This casting is produced at a good rate, although an insert has to be placed in each cavity.

Castings *B* and *D*, fig. 1, have conical steel inserts and are cast with the axis of the piece at right angles to the die parting. This necessitates a tulip or die-within-a-die construction,

FIG. 5—A Denison hydraulic press trimming flash from a magnesium lawnmower gear casting. Note the caster mounting of the press.

involving two partings in plane at right angles, as otherwise the castings would not clear the die because of undercuts. This casting (*B*) is made in a Lester machine and scrap castings are said to be limited to 5 pct.

The 7-in. internal gear, shown at *C*, fig. 1, is for a Yard-Man lawn mower and the cast teeth run in mesh with a pinion of sintered iron powder running in grease. Tests are reported to indicate a life several times longer than for the usual iron gear and pinion. This is attributed in part to the low affinity of magnesium to iron. A needle bearing is used in the hub hole. The gear weighs only 0.7 lb. The gears are given the usual chrome pickle before delivery and are covered by a steel plate in the final assembly.

Some magnesium castings are given a dip coating of Rust-Ban 392 for temporary protection aaginst surface corrosion in shop or storage until machining is done, but chrome pickling is commonly recommended as a surface protection or for use under applied finishes.

Among the largest magnesium castings produced are aircraft wheels, two of which are shown at *E*, fig. 1. These wheels are 7x8-in. size, 9⅝-in. OD, and weigh 2¼ lb.

Recently, textile bobbins on the order of that shown at *N*, fig. 1, have been cast with considerable success, and with the close approach to perfection demanded, even though overall length is about 12 in., and the wall is only 0.075 in. thick. Uniformity is said to be such that no machinery or balancing are required even though operating speeds exceed 10,000 rpm.

Specifications provide that the walls of these parts, as cast, may not vary more than 0.005 in. in thickness, which means that the core cannot be more than 0.0025 in. eccentric. A casting of this type, shown being removed from the machine in fig. 3, has its axis in the die parting and the rather long core is pulled by a ram in a hydraulic cylinder shown projecting from the die.

Flash removal is done much as in other die-casting plants except that the larger tools used are mounted on caster bases, as in fig. 5, to facilitate shifting, as it is often easier to change the location of these tools than to shift large tote boxes of castings about. Where trim or shaving dies are most convenient for flash removal, they are used in Denison hydraulic Multipresses, fig. 5, as these have been found fast, safe, quiet and convenient and upkeep has been low. Some 700 castings an hour are often trimmed in such presses.

Much grinding along parting lines is done on a Delta abrasive belt machine of the backstand idler type, with 6-in. wheels that turn at 1750 rpm. When magnesium castings are ground on these belts, which are 60 to 240 grit, depending on the finish required, no loading of belts results, but it is essential that the fine chips ground off be drawn into a protected compartment where ignition cannot take place.

This is accomplished by using a Hydro-Whirl dust collector which draws the chips into a spray of water below which they collect as a sludge which is removed to a dump and burned at intervals. The belt runs over a yielding rubber wheel at one end, as this permits the belt to be deflected enough to conform to the general shape of the area being ground. Such grinding is rapid and is often done conveniently where a trim die is either not useful or would cost more than conditions warrant.

Contour Sawing Hardened Steels and Carbides

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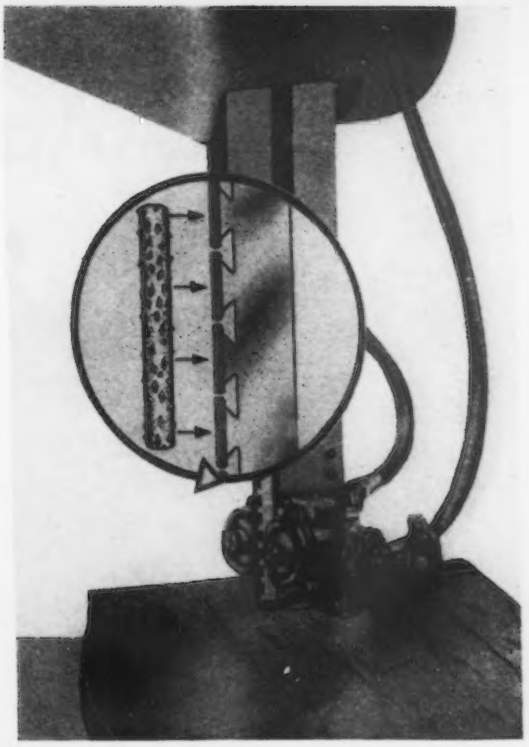

THE diamonds are embedded in a sintered tungsten matrix and brazed to the band saw tooth, as shown in the insert. Die steels, tungsten carbides, vitreous materials, and other extremely hard substances can be contour sawed by this method.

A DIAMOND band saw for cutting tungsten carbides and hardened steel, as well as stone and vitreous materials to a layout line with precision comparable to that of conventional contour sawing has been developed by the DoAll Technical Institute, Des Plaines, Ill..

By cutting direct to desired contour, the material removed is salvageable, an important factor where valuable materials are being cut. It also eliminates, the institute reports, the conventional method of shaping the material to the desired form by multiple cuts with a diamond impregnated wheel, or successive rough and finish contour grinding operations.

There are three basic tooth designs for the diamond band saw. These designs give maximum flex life to the band while minimizing the bending stresses in each segment of the diamond tooth band. From these designs, variations can be made up to meet specific cutting problems.

Tests have indicated that the 24-pitch diamond saw blade is best for cutting materials up to 2-in. thick. The pitch of a diamond blade is considered as 1 ft, and this band has two diamond impregnated segments per inch. The 8-pitch band, with one segment per 1½-in., is suited for cutting materials 2-in. and over in thickness. The 1-pitch band has only one segment per ft, and is best suited for very thick work sections. The kerf left in the material by these bands is about 1/16-in. wide.

The impregnated segments of the saw bands are cylindrical and consist of diamond bonded in a sintered tungsten alloy matrix, as shown in the accompanying illustration. They are brazed into position on the "tooth" of the band. The tooth design in the band serves to minimize stress concentration, and reduces flexation stresses within the individual diamond impregnated segments. The construction of the diamond segments makes possible the use of a variety of diamond bonding matrices, depending upon what is desirable for optimum cutting of a particular material.

The space between each diamond tooth and the saw gullet has been designed to entrap collant to dissipate heat and flush away dust or sludge. The spacing of the diamond segments is said to insure adequate cutting pressure without undue band distortion and the complete washing action of the coolant facilitates cutting thick as well as thin sections. With the diamonds located throughout the cylindrical matrix or cutting segment, it is possible to do some lateral or sidewise cutting. This is advantageous in negotiating small radii.

From tests conducted, hard, brittle metals will cut similarly to stone and glass. However, in cutting hardened, tough metals, it appears that diamond segments with softer matrix give the best results. A ⅝-in. thick hardened steel die was cut at the rate of 1/10 sq in. per min. Pieces of tungsten carbide up to 1-in. thick have been cut at the rate of 1/20 sq in. per min.

Hard optical glass up to 4 in. thick has been cut on a 4-in. radius. Softer glass has been contour sawed up to 8 in. thick. Cutting rates over 3 sq in. per min have been obtained. Petrified wood disks 7-in. diam were cut at a rate of more than 1 sq in. per min. This test illustrated the importance of tooth spacing. Using the 24-pitch blade, the cutting rate was only 1/6 sq in. per min, while an 8-pitch blade gave more than six times this cutting rate.

Applications of the

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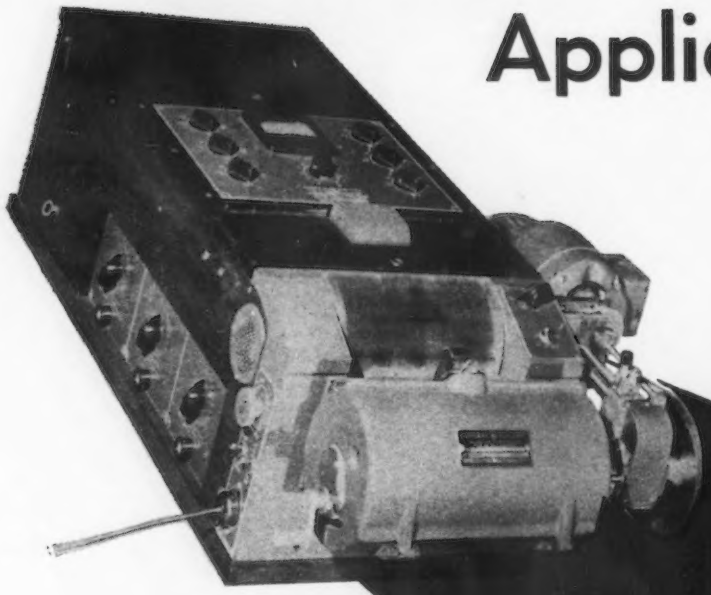

Typical oscillograph unit, with mag
ing head and ac motor unit, is shown
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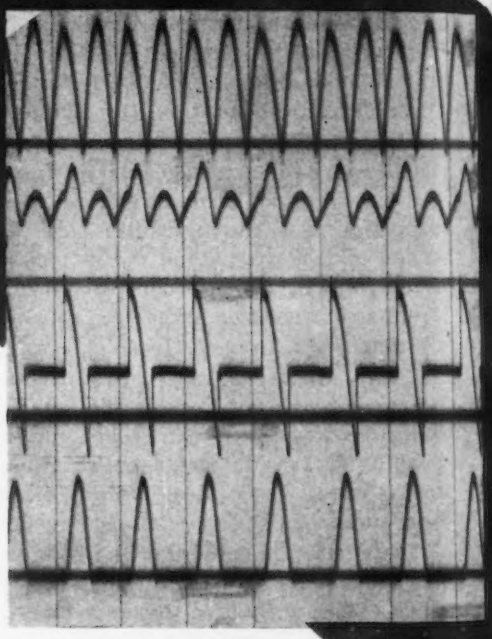


FIG. 1—This oscillogram of th
power supply to a 1/2-hp motor illu
ability of a magnetic oscillograph fo
taneously record interrelated multiple co
nents. *A* is the motor field voltage; *B* is
motor field current; *C* is the voltage of th
motor armature; and *D* is the armature current.

THE oscillograph is capable of photographically recording one or more quantities and can be calibrated electrically in relation to vibration, noise, pressure or strain, as well as electrical phenomena. The record takes the form of a photographic comparison of the known voltage sine wave of the instrument with that of the equipment under test. The instrument's ability to record several quantities simultaneously permits accurate analysis of operation where there is an interrelation between two or more functions, as shown in fig. 1.

New trends in control have created a great field for the use of multiple range instruments such as the magnetic oscillograph. There are now several devices for a variety of control purposes in which the magnetic oscillograph is uniquely adaptable to securing engineering data, and there is an increasing variety of strain gages that can be used as primary elements.

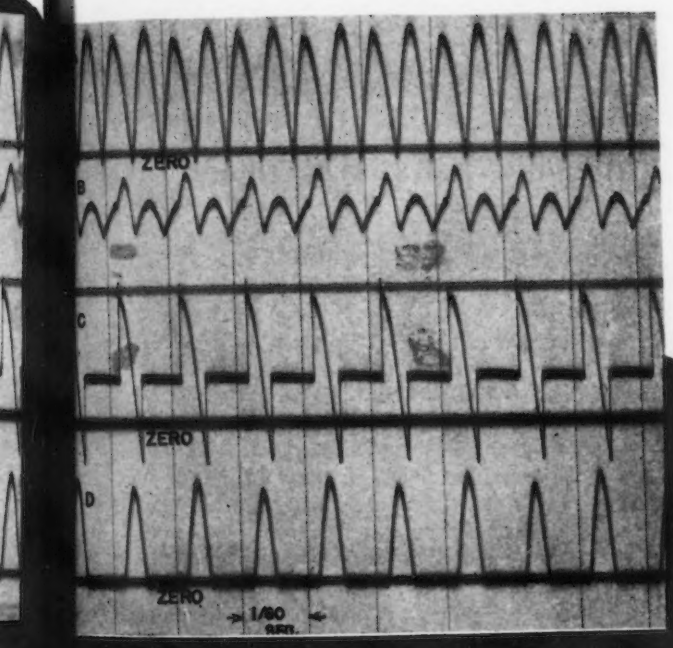
The new and extended field of pneumatic technology has also created uses for the magnetic oscillograph. Pneumatic relays, numerous circuit combinations, pneumatic amplifiers of great simplicity, and electronic control circuits all correlate multiple components that are interrelated.

The magnetic oscillograph is especially valuable in enabling engineers and technicians to obtain data and performance tests for design and sales purposes, as the resulting oscillograms, the records which oscillographs produce, provide positive lasting proof of performance in easy-to-read graphical form.

The oscillograph elements are d'Arsonval galvanometers with a maximum sensitivity of 1.5 milliamperes per mm deflection on the oscillogram. With appropriate shunts, oscillographs can be used to indicate larger values of current,

Magnetic Oscillograph

The magnetic oscillograph has emerged from electrical laboratories to become an engineering tool with a variety of uses in many fields. This article discusses the instrument's possibilities and limitations and some of its unique applications in the metalworking industry. The oscillograph's ability to produce a positive lasting record of noise, vibration, pressure, strain and electrical characteristics of equipment makes it especially valuable in obtaining data for design and sales purposes.



or with appropriate series resistors, will indicate voltages. Standard instruments have a frequency range from 0 to 2500 cycles per second.

In fact, the magnetic oscillograph is a universal instrument limited only in frequency when proper shunts, resistors and ratio transformers are used. The diversity of their application is dependent only upon this fact and the ingenuity of the operator.

In problems of mechanical design, engineers are frequently confronted with the necessity of obtaining stress and strain data that are difficult to obtain except through the use of strain gages, and the oscillograph is perfectly suited to

ELOW

urve for a punch
1/2-sec inter-
f pres-

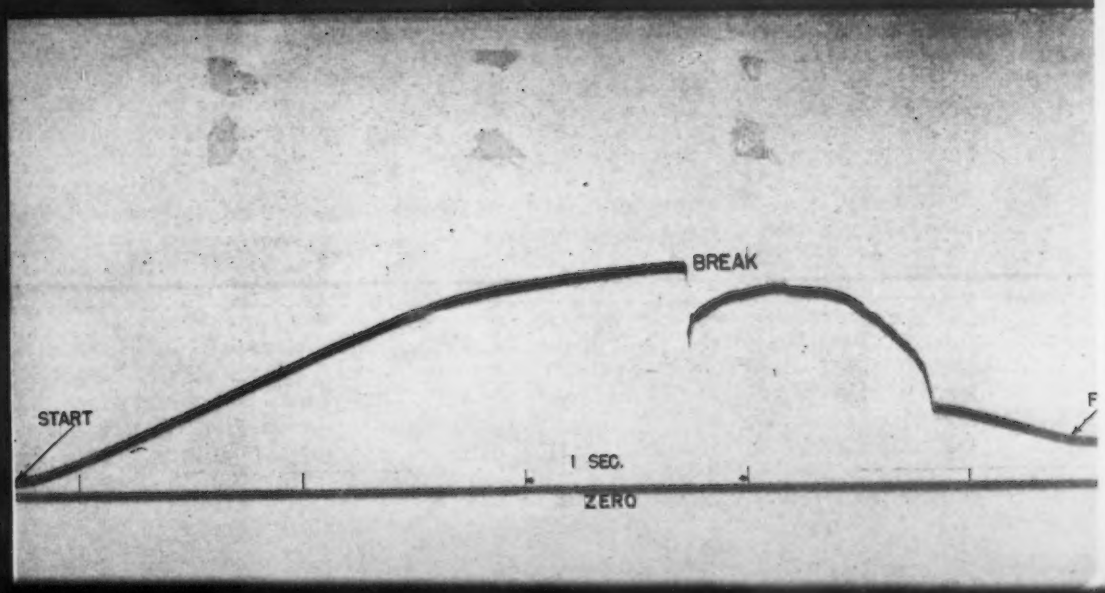


FIG. 3—Oscillogram shows a test by which strain gage response to bearing torque measures the degree of roughness of the bearing.

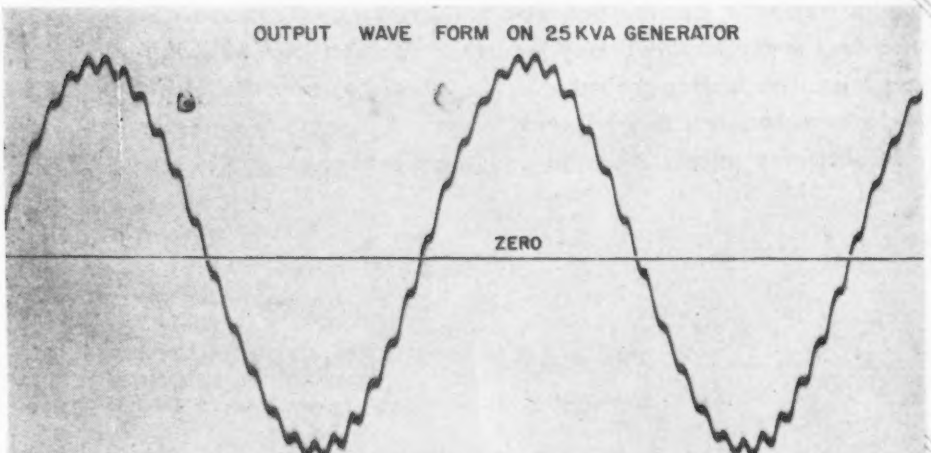


FIG. 4 — Oscillogram shows the output wave form of a generator. Such an oscillogram allows analysis of the predominate harmonics of the base wave.

the task of recording the strain gage responses.

In a punch press operation, for example, it was required to find the amount of pressure applied to the punch to cut a 1-in. diam hole in a piece of sheet metal at a 1½° shear angle. By the use of a strain gage and amplifier the oscillogram shown in fig. 2 was taken.

A resistance wire strain gage was mounted on the punch shank to respond to the strain on the shank during the punching operation. The gage was one leg of a bridge circuit, and hence when the punching operation was made, the stress on the shank of the punch changed the resistance in the gage and unbalanced the circuit. The unbalance was directly proportional to the amount of stress on the punch shank which was the pressure applied to punch the hole. The output from the strain gage amplifier was recorded on the oscillogram as shown in fig. 2. The oscillograph was calibrated by placing the punch shank in a hydraulic press and observing the pressures required to produce a similar strain distortion. The calibration was in pounds pressure per millimeter deflection on the oscillogram.

The use of the oscillograph with strain gages was described in "Strain Gage Analysis of Mechanical Punch Presses," THE IRON AGE, *Jan.* 15, 1948.—*Ed.*

The oscillograph recorded the time elapsed for punching, the amount of pressure applied, breaking point and follow-up cutting pressure as the 1½° shear angle punch progressed through the metal.

Another effective application of the oscillograph is to determine roughness of bearings. In one manufacturing operation, it was found that high speed, thread spinning motors on assembly line tests were showing intermittent high and low wattage input.

The engineer suspected defective bearings, and consequently a test was set up to determine bearing losses.

A bearing from a motor with high losses was mounted on a shaft and run at normal speed. A suitable tape was wrapped around the bearing and attached to a strain gage device that would respond to small tension.

This device consisted of two strain gages mounted on a rigid plate. The tape was attached to one end of an arm mounted between the gages, and the arm was mounted rigidly to the plate at one end and to the tape at the other. Slight tension on the bearing was recorded in the oscillograph as an unbalance of the strain gage bridge network, which was calibrated directly in ounce inches as shown in fig. 3.

The oscillograph, then, proved that the bearings were defective and rough and were the cause of the intermittent high wattage loss in the motors.

Analysis of voltage and current wave forms taken by the oscillograph provide information on a unit's characteristics. For instance, predominate harmonics of the base wave can be determined from an oscillogram of a generator wave form, similar to the one shown in fig. 4, and its deviation from a true sine wave can also be calculated directly. This is accomplished by

dropping points from the curve to the zero line over 180° of the cycle, and then plotting the resulting values on polar coordinates.

A true sine wave would be a perfect circle as shown in fig. 5. It would be very difficult to design a machine with a perfect sine wave, however, and manufacturers and design engineers have simply maintained certain standards that products must meet. These standards take the form of percent deviation from a perfect sine wave, and can be found by the polar coordinate method.

In this method the values are plotted on polar coordinates and a circle is drawn through the points so as to give a maximum diameter and still maintain an equal balance of the deviation on each side of the circle which would represent a true sine wave. The percent deviation is then found by dividing the maximum arc length, which is the diameter of the circle, by the maximum deviation in arc lengths on either side of the circle. For the wave form in fig. 4, the percent deviation was 5 pct, and the polar coordinate plotting of the data is shown in fig. 5.

Speed-torque curves from acceleration oscillograms provide a method of measuring starting torques of large, induction starting, synchronous motors and can aid or replace the power input and dynamometer methods. Accuracy comparable to the dynamometer test can be obtained. The test is taken at full voltage, requires no corrections for windage or friction, and can be made with a simple test setup. All that is needed on the acceleration oscillogram is line current, field discharge current, and speed. The speed voltage for tracing the curve, which is proportional to the speed of the motor under test, should come from a ripple-free source, such as a relatively ripple-free tachometer generator mounted on the end of the shaft of the machine under test.

This will leave no doubt as to whether a change in the speed curve was due to a ripple of the tachometer generator or a slight change in the motor speed.

Briefly, the method of calculating speed torque curves from a time-speed oscillogram begins with the speed and time calibration. These are in terms of revolutions per second per millimeter and seconds per millimeter. The quotient of the two is a constant, which when multiplied by the measured slope of the tangent to the speed curve at any given point, determines the acceleration at that point. The moment of inertia of the motor and tachometer generator, unless it is negligible compared to that of the motor, and the normal full load torque may also be included in this factor to give a constant which when multiplied by the slope gives the direct percentage value of full load torque, the term commonly used by motor engineers.

In practice then, the speed curve is divided into a convenient number of increments along the time axis, and values for the tangent slope and for the amplitude are noted at each desired time value. The resulting data are converted and plotted to give a complete speed-torque curve in which percent synchronous speed will be shown as a function of percent full load torque.

One of the simplest ways of determining acceleration, deceleration or speed of a rotating shaft, disk, motor, or part is by the use of the magnetic oscillograph.

The points for an acceleration curve can be taken directly from an oscillogram on which the acceleration intervals are recorded as impulses from a photoelectric cell. A mirror on the shaft may be used as a light source so that the photocell picks up each revolution. More mirrors may be used if greater accuracy is desired, and accuracy may be obtained to at least 1/10 revolution if necessary. These intervals are checked against a 60-cycle timing wave to determine the points for the curve, which would then show revolutions per sec/per sec. Deceleration curves may be made in the same way.

References

C. R. Atkinson and E. G. Downie, "The Acceleration Oscillogram Method of Motor Torque Measurement," Electrical Engineering, January, 1942, p. 7-9.

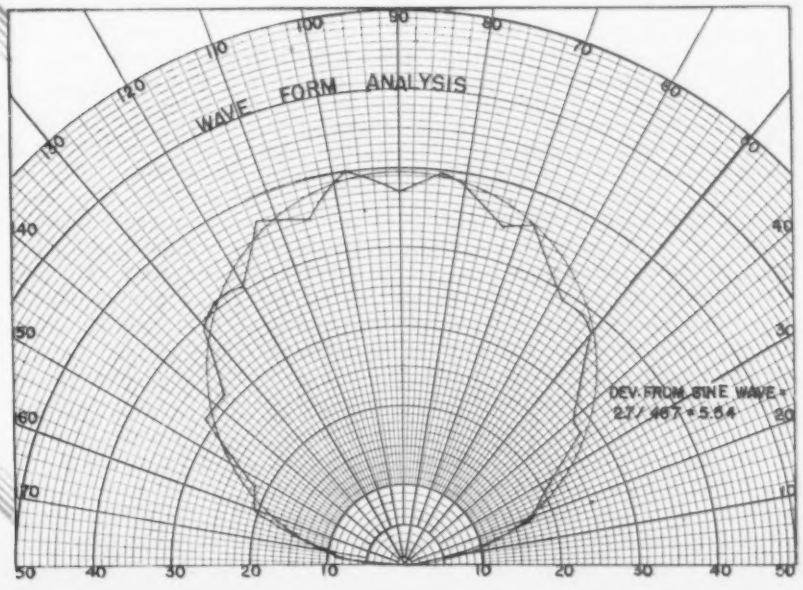


FIG. 5—A typical application of the polar coordinate method of wave form analysis is shown here. The wave form being analyzed is the one in fig. 4.

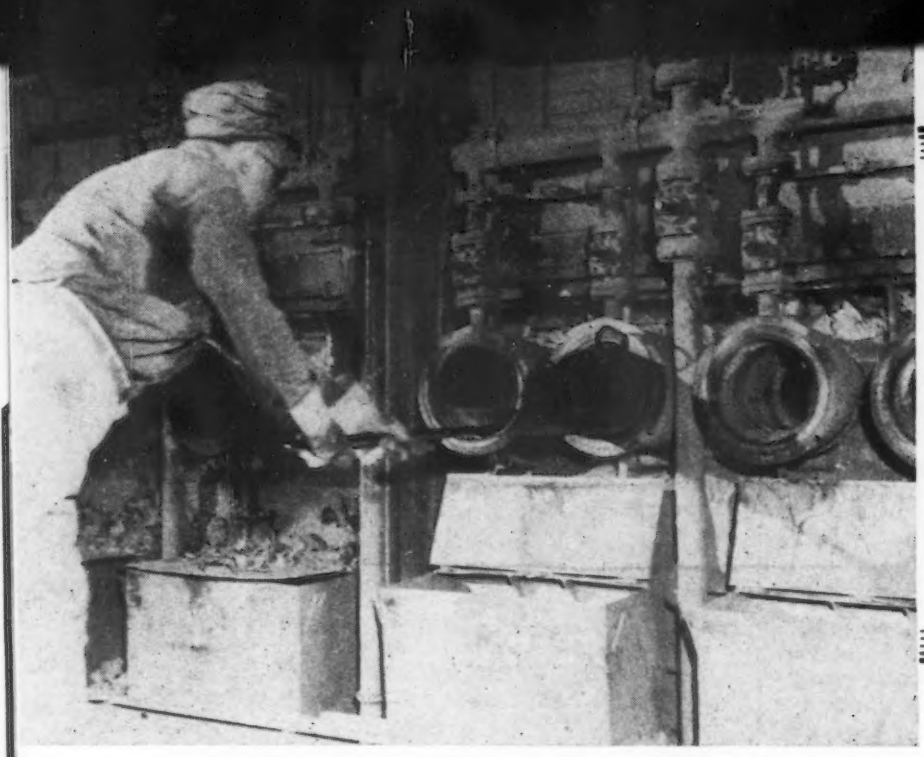


FIG. 11—Photograph of vacuum furnaces used for preparation of magnesium by the Pidgeon process.

Industrial Va

MANY of the materials commonly used in furnace design evolve so much gas when used in vacuum that it is uneconomical, perhaps even impossible, to obtain low pressure in their presence. Building materials must be selected on the basis of their behavior at reduced pressures.

Gas may be evolved from a material in several ways. Nearly all materials contain a certain amount of adsorbed gas which is spread over the entire surface in monomolecular layers. The amount of gas held in this way is a function of pressure. A material when left exposed to the atmosphere comes to equilibrium for 760 mm of gas pressure. When put under reduced pressure, it is compelled to give up some of its adsorbed gas in order to reach equilibrium for this new pressure. The quantity of adsorbed gas which must be pumped from a material during evacuation is a function of the nature of the material, the amount of surface area exposed, the final pressure to be reached, and the past history of the material.

In the first part of this article, THE IRON AGE *February 19, 1948, p. 64, the authors described various design and construction features of vacuum melting equipment and indicated the influences of these factors on vacuum production, maintenance and measurement.—Ed.*

Material which presents a great deal of surface, such as carbon black and other finely-divided porous powders, is difficult to evacuate in large quantities, since it has so much surface to adsorb gas. Naturally, the final pressure to be reached has much to do with the seriousness of evolution of adsorbed gas. If pressures in the vicinity of a millimeter are to be used, outgassing is almost unnoticeable. From a millimeter to 1 micron, more difficulty is encountered; while below 1 micron, maintenance of low pressure is largely a matter of overcoming evolution of adsorbed gases.

A finite time is required for adsorption of gases by a degassed surface exposed to atmospheric pressure. For this reason the amount of gas evolved by a surface on evacuation is a function of past history. Fig 12, curve A, shows a pumpdown curve for a steel tank which has been exposed to atmospheric pressure for 3 days. Curve B, fig. 12, gives a pumpdown curve taken after the system has been well degassed by continued pumping. Once adsorbed gas has been removed, readsorption is fairly slow, and the surface in question may be exposed to atmospheric pressure for hours, and sometimes days, without reaching its initial state of contamination. Because readsorption does occur, no matter how slowly, it is good practice to keep a vacuum furnace under vacuum constantly, opening only long enough to charge and discharge.

The rate of evolution of adsorbed gas from a surface is increased as temperature is increased. A vacuum furnace may be rapidly degassed by allowing the temperature of the furnace shell to rise above that required in ordinary operation. After such degassing, the furnace when operated at normal temperature will evolve little gas.

Evolution of adsorbed gas in a vacuum system may be troublesome, but it can be overcome by long pumping with the application of heat

Vacuum Melting . . .

The application of vacuum to the melting of metals on a commercial basis introduces problems of design, construction and operation that can be overcome only by intelligent use of the vacuum equipment. Materials of construction, types of heat sources, and techniques for casting under vacuum, some of the important factors which must be considered, are discussed in this article. Also presented is a selected bibliography relating to various aspects of vacuum processing.

By KENNETH FOX, R. A. STAUFFER and W. O. DiPIETRO

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and rarely means more than the difference between, say 1 micron and 100 microns in the vacuum chamber. On the other hand, decomposition of the construction materials as a result of reduced pressure can be far more serious. Many structural materials used in furnaces contain a certain amount of water held ordinarily as water of crystallization. In vacuum, even at room temperature, this water appears to be given off slowly, thus preventing maintenance of low pressures in a vacuum system. Sometimes materials decompose with slow evolution of other gases. No means is available for predicting the behavior of ordinary structural materials in vacuum. It is necessary to run pumpdown tests at varying temperatures to check the performance of any material with which one has not had previous experience.

In the design of a vacuum furnace it is necessary to give some thought to reactions which may occur between furnace parts of different materials and also between furnace parts and the metal being processed. Maintenance of high temperature at reduced pressures encourages reactions which give rise to gaseous or volatile products. Carbon or graphite should never be used in contact with refractory oxides at temperatures much in excess of 2000° F. Almost invariably, slow reduction occurs, giving rise to carbon monoxide which causes a marked pressure rise and contributes to carbon contamination of the melt. Similarly, alloys containing carbon should not be used in silica crucibles, as reduction of the silica by carbon will occur. The melt will then be contaminated by silicon, and carbon monoxide will be evolved. Such a reaction occurs when a steel is handled in magnesia, but the rate of reaction is so much slower that harmful effects are much less pronounced. Problems involving inter-reaction of furnace parts and reaction between the melt and furnace parts may be anticipated by thermodynamic calculations and preliminary tests.

All the common means of heating metal can be applied to vacuum—gas, electrical resistance, arc, or induction. The choice of applying the heat inside or outside the vacuum chamber can be made in all cases, except when gas heating.

The first vacuum furnace units of any size used in this country for a commercial process were those installed for preparation of magnesium metal by the Pidgeon process,[4, 5, 6] (fig. 11). These consisted of banks of evacuated alloy steel tubes 10 ft long and with 10-in. ID. These were heated externally by gas firing and evacuated by means of diffusion pumps backed by mechanical pumps. Normal operating pressure was 5 to 10 microns with temperature around 2000°F. The temperature of operation required oxidation-resistant alloys, and the pressure of

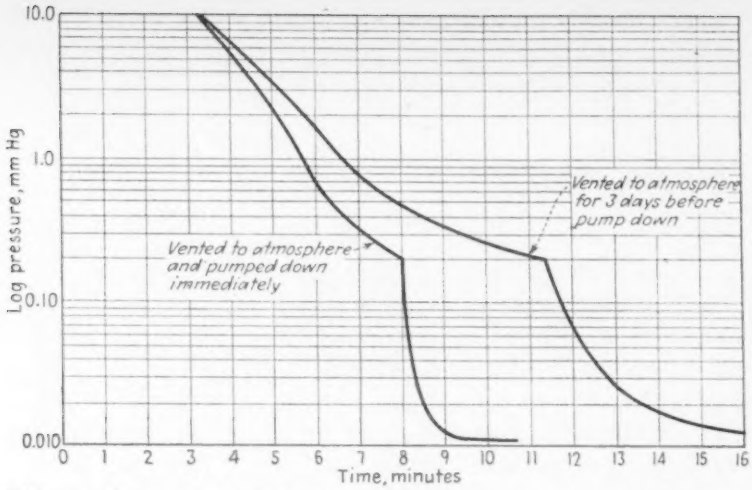
10.0
1.0
0.10
0.010
Log pressure, mm Hg
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Time, minutes
Vented to atmosphere and pumped down immediately
Vented to atmosphere for 3 days before pump down

FIG. 12—Curve demonstrating the effect of outgassing on pumpdown time of vacuum chambers.

almost one atmosphere across the shell required a wall thickness of 1 in. or more. Casting of the tubes was necessary, and leakage of the tubes presented a problem which was partially solved by welding and peening.

A more serious difficulty was that of softening which led to flattening of a tube over a period of 100 days so that it could no longer receive a charge. Porosity ruled out the use of all ceramics tried, but ceramics were used as liners to stiffen the tubes in some plants. The more common method of extending life was to allow the normal flattening and then blow the tube back to original shape by use of compressed air.

This construction is of little interest in the melting and casting of metals because of the temperature limitations and the great wall thickness that would be necessary for a large vacuum melting furnace. Gas-fired retorts are suitable for vacuum thermal reduction of some metallic compounds and for similar low temperature operations.

The use of electrical heat instead of gas for the externally-fired retort-type furnace does not solve any of the problems encountered with gas firing, but electrical resistance heating does permit an improvement in design. The hot furnace tube may be surrounded by a second vacuum retaining wall which encloses the insulation and heating elements (fig. 13). A partial vacuum may thus be pumped around the retort so that the pressure inside and outside of the hot retort may not differ enough to cause collapse. By this means, thin-walled retorts may be fabricated from nonporous rolled metal, making it possible to obtain high vacuum.

Resistance furnaces can be constructed with heating elements and insulation enclosed in a vacuum-tight chamber. In order to have application in the melting and casting of metals, it is necessary that heaters of carbon, molybdenum, or tungsten be used. Since such elements are readily oxidized on exposure to air while hot, it is necessary to cool the furnace before opening at the end of a cycle. Silicon carbide heaters may be used in vacuum up to about 2550°F, at higher temperature decomposition begins to occur. In addition, heating is slow in such a furnace because heat must be transferred by radiation to the crucible containing the metal charge. Good insulation must be supplied to

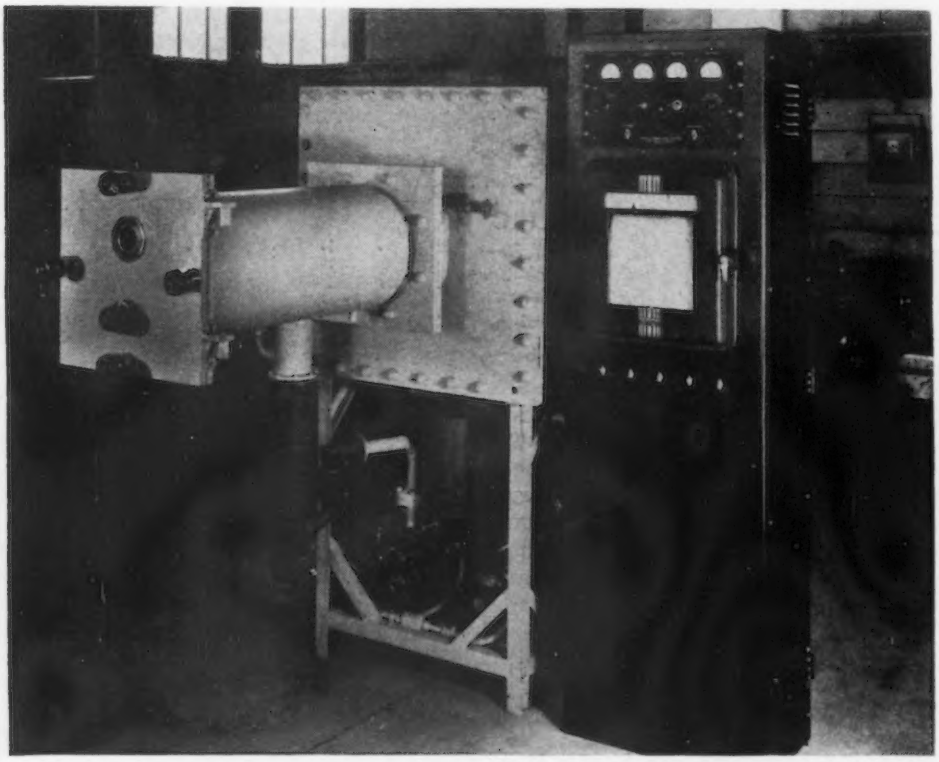

FIG. 13 — Photograph of double pump vacuum muffle furnace.

prevent excessive heat loss during the long melting cycle. The net result is that the furnace chamber contains so many sources of gas evolution that only poor vacuums may be obtained.

It has been suggested that metallic heat shields be used to eliminate the use of insulating materials, which are the major source of gas evolution. Furnaces of this type have been built, and it has been shown that excellent pressures may be obtained, but for many melting operations it is necessary to use heat shields fabricated from molybdenum and tungsten, which limits commercial value of the furnace in two ways. In the first place, the size of the furnace is limited, since molybdenum and tungsten are as yet only available in limited sizes. Secondly, as in the case of heating elements, molybdenum and tungsten oxidize badly in air when hot so that it is necessary to cool the furnace before opening. This lengthens the furnace cycle and wastes heat. It is doubtful whether large-scale vacuum furnaces heated by electrical resistance windings will ever come into common use for metal melting.

At the present time, induction heating is generally used for melting metals in vacuum. A water-cooled copper coil is placed about the crucible, and a high frequency current is applied, inducing currents in the metal which heats due to its electrical resistance. Heating is rapid, and there is no problem of heat transfer to the metal. Less insulation is required than for other methods, thus simplifying outgassing problems. An early form of vacuum furnace, which is ideal for laboratory experimentation, makes use of a high frequency coil placed around an evacuated quartz tube containing the crucible and charge. Very low pressures have been recorded for this type of furnace (fig. 14), but the design is limited to melts of less than 20 or 30 lb.

As previously indicated, it is desirable to enclose the entire induction furnace within a vacuum-tight metal chamber (fig. 1). The voltage across the induction coil must be limited to avoid electrical discharge in the vacuum. In practice it has been found that if high frequency power is delivered to the vacuum system at less than 400 v, little trouble will be experienced. Motor generator sets with outputs of either 200 or 400 v max are available with frequencies from 1000 to 10,000 cycles per sec. Such equipment is entirely suitable for induction heating in vacuum.

When an induction coil is housed in a metal tank, some power will be consumed in eddy current losses and hysteresis losses in the tank wall. These power losses can be reduced by fabricating the shell from a nonmagnetic metal and by making the tank diameter large with respect to the induction coil. In selecting the diameter of a tank, power loss in the tank must be balanced against construction costs and pumping costs.

Water-cooled copper leads to supply high frequency current to the induction coil may be brought into the vacuum chamber through a plate of any vacuum-tight insulating material. The insulating plate may be drawn up against a flange in the side of the vacuum tank; a rubber gasket will provide a vacuum seal. The individual power leads may be sealed against the insulating plate by a similar method.

The vacuum furnace proper must be designed

RIGHT

FIG. 14—Schematic diagram of design quartz tube vacuum furnace with external induction coil.

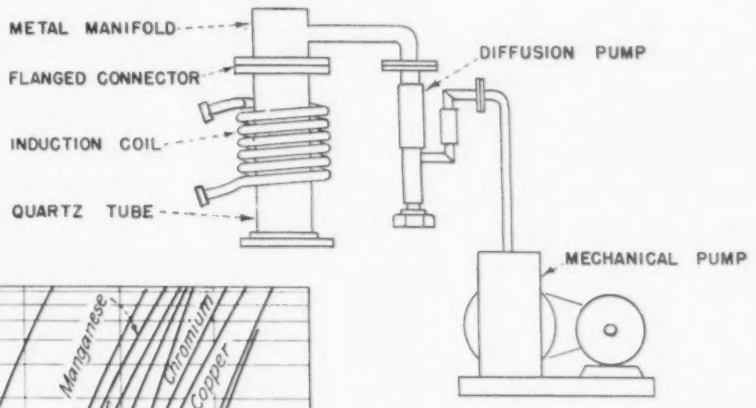

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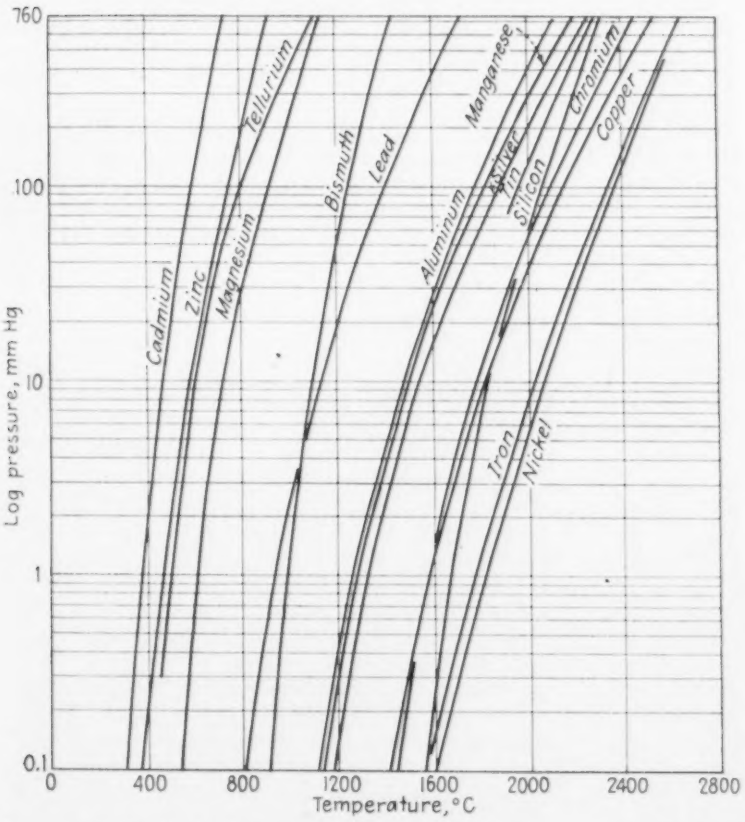
FIG. 15 — Curve of vapor pressure v. temperature for common alloying elements.



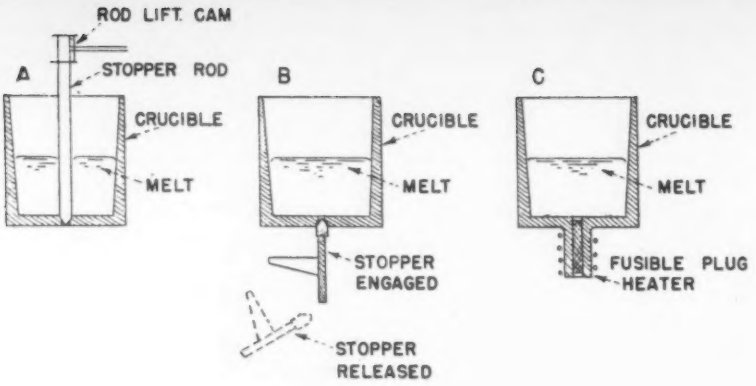


FIG. 16—Schematic diagram showing three designs for bottom pouring in vacuum.

with regard to the outgassing properties of the materials used if a good vacuum is to be maintained. All furnace parts should be tested for behavior in vacuum under operating conditions.

A recent paper by Parke and Ham[11] describes the use of a vacuum arc furnace for melting and casting molybdenum. Though few data are available, it is possible that arc heating may be used for vacuum melting and casting of many metals.

Temperature Measurement

Thermocouples for use in vacuum may be selected entirely on the basis of operating temperature. Life of the thermocouples is generally longer than in atmospheric application, since the rate of oxidation is reduced. Thermocouple leads may be brought through the tank walls by means of glass-to-metal seals. Care must be taken in selection of thermocouple protection tubes to make certain that reduced pressure does not encourage reaction between the tube and the melt.

Optical pyrometry in the higher temperature ranges is applicable to use in vacuum furnaces if a vacuum-sealed sight glass is provided for viewing through the tank walls. Calibration is required to compensate for radiation losses in passing through the glass. During a melt, vaporization of metal can readily make an opaque coating on a sight glass, but this can be limited by use of a sheet metal shield which may be rotated away when a view of the metal is required.

Loss of Volatile Constituents

Some metals tend to vaporize from a melt during vacuum processing. The tendency for a metal to be lost from an alloy by this mechanism may be estimated by comparing its vapor pressure over the melt with the residual air pressure in the vacuum chamber. This vapor pressure may be estimated by multiplying the vapor pressure of the pure metal (fig. 15) at the temperature of the melt by the mole fraction of the metal in the melt.[12,13] In order to prevent evaporation of volatile metals, the nonvolatile constituents may be separately degassed and melted at low pressures and the volatile metals added after the pressure in the vacuum tank has been raised slightly above the highest vapor pressure over the melt by addition of a neutral gas. It is better to obtain this pressure by pumping against a small leak of the inert gas rather than simply to introduce enough gas to bring the pressure up to the value desired with the pumping ports closed, since this permits constant removal of gases evolved from the melt. Such a leak can be maintained by use of a needle valve or a screw clamp on rubber tubing. In the latter case, a length of small diameter wire inside the tubing will keep the tube from collapsing and will allow fine adjustment of leak.

Charging a vacuum furnace is generally a one-step operation, that is, all the metal charge is loaded into the crucible before the lid is sealed on for the initial pumpdown. Because large quantities of ingot or scrap metals are not added during melting, the capacity of furnaces has usually been limited to the cold-charge capacity. Making additions to the melt is quite common, but charging devices are usually small and restricted to use for special alloying additions after the metal is molten. The simplest type is a bucket or series of buckets with spring-loaded bottom doors actuated by direct pull or by solenoid coil pull and arranged so as to drop the contents on a chute leading into the crucible. Multiple tilting buckets emptying into a common chute have also been used successfully. Bulk charging devices can be developed to overcome the packing factor problem, but at the present stage of development most designs simply provide sufficient crucible space to take the bulk of the cold charge.

Pouring the melt from crucible to mold requires a means for introducing motion into the vacuum chamber without leakage. The use of a bottom-pour crucible is the simplest method from a mechanical standpoint (fig. 16). A hole in the bottom of the crucible, stoppered by one of many techniques, is opened so that the metal may pour directly into the mold, which is hung vertically and as close to the crucible bottom as possible. A number of stopper designs have been suggested; the stopper rod through the

[11] *Robert M. Parke, and John L. Ham, "The Melting of Molybdenum in the Vacuum Arc," AIME TP 2052, Institute of Metals Div., No. 515, November 1946. Abstracted in* THE IRON AGE, *Nov. 28, 1946, p. 65.*

[12] *K. K. Kelley, III. "The Free Energies of Vaporization and Vapor Pressures of Inorganic Substances," Contributions to the Data on Theoretical Metallurgy, Bureau of Mines Bulletin* 383.

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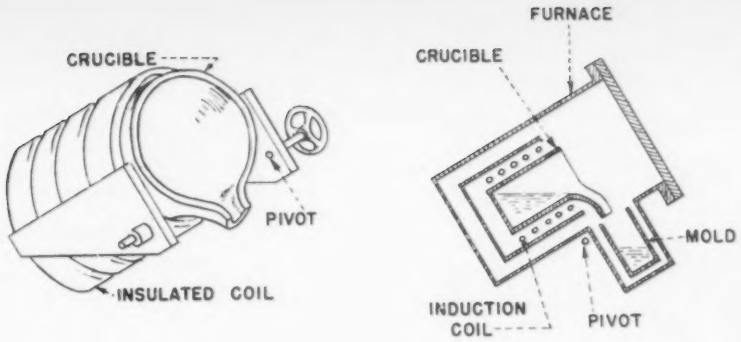

FIG. 17—Schematic diagram showing two designs for tilt pouring in vacuum.

melt from the top, the stopper plug held up from below, and the fusible plug.

The first method has the disadvantage of further restricting the crucible capacity and encouraging "bridging" over of the top of the charge as the bottom melts away. It also presents an additional refractory oxide surface to the metal for possible contamination by reduction or spalling of the refractory, but it has the advantage of allowing free flow of the metal from the crucible. The second method, involving a stopper held from below, has been successfully applied. Equipment must be designed in such a way as to bring the stopper head down and to the side in one rapid motion. The major problem in this design is the provision of the sufficient compression on a well-ground stopper seat to prevent leakage of metal. Methods involving ceramic stoppers are limited by the weakness of these materials at high temperatures.

A number of the furnaces at Heraeus-Vacuumschmelze were equipped with fusible plug pouring devices. A plug of the material to be melted is placed in a tube below the crucible and is kept below the melting point of the metal. When ready to pour, a high frequency current or a resistance heater melts the plug and permits draining of the crucible. This method is practical for a long series of large melts of the same metal but is too complicated for use when many alloys must be used.

Tilt pour vacuum furnaces may be designed in two ways (fig. 17). The entire chamber may be tilted with the induction furnace stationary, relative to the tank, or the induction furnace may be tilted within the vacuum chamber. In the first arrangement it is necessary to rotate the vacuum chamber with the pumping manifold as an axis in order to permit use of large diameter high-speed vacuum lines. This requires a rotary vacuum seal between the manifold and the chamber. In operation of such a furnace it is desirable to design the mold in such a way that it remains vertical throughout the pour. The mold is made stationary, relative to the vacuum tank, and allowed to rotate with the tank, and if this happens, there is danger of the melt striking the side of the mold. This is apt to produce ingots containing serious cold shuts.

Rotation of the induction furnace inside a stationary vacuum tank requires a larger tank than the method described in the foregoing paragraph but has certain advantages. The use of a rotary seal on the pumping manifold may be eliminated, thereby reducing danger of leakage in the system. A stationary mold may be used without danger of cold shuts.

Molds for Casting Under Vacuum

If full advantage is to be gained from vacuum melting, casting must also be carried out in vacuum. For this purpose a mold must either be enclosed in or attached to the melting chamber. If attached, the mold must be vacuum tight or must be enclosed in a vacuum-tight shell, and the seal to the vacuum chamber must be constructed in such a way that gaskets are not damaged by exposure to molten metal or hot mold walls. In all cases the mold material should be selected to give a minimum of gas evolution when cold and also when in contact with molten metal.

Sand molds as prepared by conventional techniques are never completely dried. When such molds are handled in vacuum, evolution of water vapor and oil will be sufficient to make it almost impossible to maintain pressures in the micron range. Prolonged degassing may make sand molds suitable for use in vacuum, but Rohn (of Heraeus-Vacuumschmelze), on the basis of his experience with commercial vacuum melting in the millimeter range, strongly advises against the use of sand molds.

Small investment molds similar to the ethyl silicate bonded silica molds used in the precision casting field have been used successfully in vacuum. However, this is only possible if the molds are thoroughly degassed in vacuum before casting.

Ceramic molds and graphite molds may be used provided they are enclosed in the melting chamber or are attached with a vacuum-tight shell. Such molds may be evacuated without preliminary outgassing, but on casting, some gas is evolved from the mold wall, and ingots show porosity just under the surface. This difficulty may be avoided by degassing the molds in vacuum before use or by raising the pressure in the vacuum chamber to a few millimeters of some inert gas before casting.

Water-cooled molds when properly constructed give excellent results in vacuum casting. No preliminary vacuum treatment is required for such molds and little gas is evolved even during casting. Some care in design is required to prevent bonding between the metal being cast and the mold wall. This situation cannot be avoided by use of mold washes unless provision

is made for degassing the mold after application of the wash. Colloidal graphite applied from an acetone suspension behaves fairly well from the standpoint of outgassing and helps to eliminate cold shuts on the surface of castings but is of little value in preventing bonding. Bonding may be avoided by use of a high con-

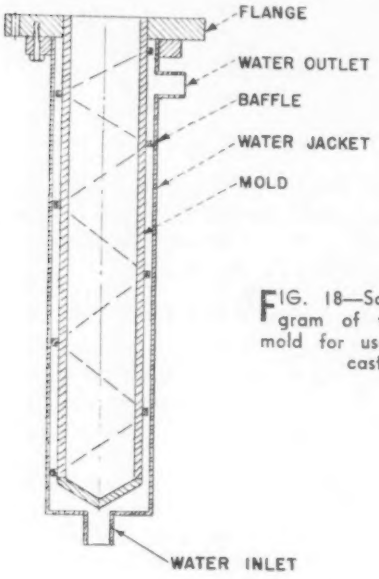

FIG. 18—Schematic diagram of water cooled mold for use in vacuum casting.

ductivity mold wall such as copper and by providing rapid flow and even distribution of water over the mold walls (fig. 18). Since such a mold is kept cold during casting, the ingot shrinks away from it on cooling, and for this reason ingots can be removed, even though no taper is provided. Nevertheless, a slight taper is advisable to compensate for slight distortions in the mold wall which may arise after long service.

In recapitulation, it can be concluded that:

(1) Induction heating is the most practical method of heating for use in commercial vacuum melting. For melts greater than about 20 lb the induction furnace should be enclosed in a vacuum-tight metal tank.

(2) Output of the power supply should be limited to 400 v to avoid electrical discharge in vacuum.

(3) Bottom pouring of melts is simple from the standpoint of vacuum design, but it is complicated at high temperatures by refractory problems. When the metal to be processed has a melting point in excess of 2500°F, and cannot be melted in graphite, it is advisable to use tilt pouring.

(4) In casting ingots or simple shapes, water-cooled copper molds give excellent results.

(5) In order to maintain pressures under 0.1 mm Hg in a vacuum furnace, it is necessary to use diffusion pumps, to provide pumping lines of proper speed, and to select furnace materials which do not outgas badly or react to produce gaseous products.

(6) Vacuum technology is sufficiently advanced to permit construction of high vacuum furnaces large enough to handle ton melts. Five to 500-lb melts being conducted in various laboratories are demonstrating that industrial applications of such furnaces may be warranted.

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Low Temperature Treatment of Steel

How long should parts be held at the low temperature? How soon should the work be subjected to the low temperature after the quench? Is there danger of cracking in parts subjected to low temperature? These and other typical operating questions are discussed for the benefit of the practical metallurgist and heat treater in this concluding part of a three-part article. Also considered is the effect of low temperature treatment on some medium carbon structural steels and some alloy carburizing grades.

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THE question frequently arises as to what is the effect of low temperature treatment on some of the medium carbon structural types of steel. The author has, for reasons of academic interest, done some investigating along this line with the straight carbon as well as the low alloy types, all in the medium carbon range. Actually one might summarize the results very quickly by stating that the effect on this class of steels is negligible because results are such that they would usually be regarded as within limits of experimental error. As a matter of interest, however, a few of the results are shown here.

Fig. 18 shows results of some work done with C-1045 steel (0.46 pct C and 0.55 pct Mn). Specimens for this test were austenitized at 1550°F and water quenched. Hardness measurements taken on these specimens as-quenched showed 60 RC which then decreased as the tempering temperature increased. Percent of retained austenite was found to be only 5.5 pct, as-quenched, and decreased with increase in tempering temperature until a 100 pct transformation was effected by tempering at 500°F. Specimens subjected to −125°F prior to tempering showed results identical with those not cold treated.

Fig. 19 is a chart showing results of tests made using C-1137 steel (0.36 pct C and 1.45 pct Mn). Specimens used for this data were oil quenched from 1575°F. The hardness was found to be 50 RC after quenching. This hardness persisted until after a tempering temperature of 375°F was surpassed, and then decreased gradually. Specimens in the as-quenched condition showed 6 pct retained austenite which decreased with increase in tempering temperature. A 100 pct transformation was effected after tempering at 600°F. As in case of the C-1045 steel, the specimens that were low temperature treated prior to tempering showed absolutely no difference from those not subjected to low temperature.

Another type of lower carbon steel on which the author did some work should at least be mentioned. This alloy was type 410 stainless steel (0.12 pct C and 13.00 pct Cr). Specimens for this test were austenitized at several different temperatures, ranging from 1750° to 2050°F. It was interesting to note that the amount of retained austenite after oil quenching from 1750°F was not high (about 10 pct), and this amount did not alter to any appreciable extent for the 300°F increase in austenitizing temperature (probably none outside the limits of experimental error). Also, the low temperature treatment had absolutely no effect on these specimens irrespective of their austenitizing temperature.

A class of steels will now be discussed, which in the author's estimation, is benefited to a greater extent by low temperature treatment than many of the high carbon and higher alloy steels. This class is the alloy carburizing steels. For steels of this type, it is necessary to use a different method of attack in order obtain accurate test results. All types of steel which have been discussed so far have been of the through-hardening type. In all cases the type of quench and size of test specimens were employed so that they were hardened clear through. Using this method it becomes an easy matter, with proper equipment, to accurately measure the austenite volumetrically.

A complete discussion of the equipment and the method used for measurement of austenite would be too lengthy to be explained in detail. The principle involved is that of taking advantage of the fact that austenite (gamma phase)

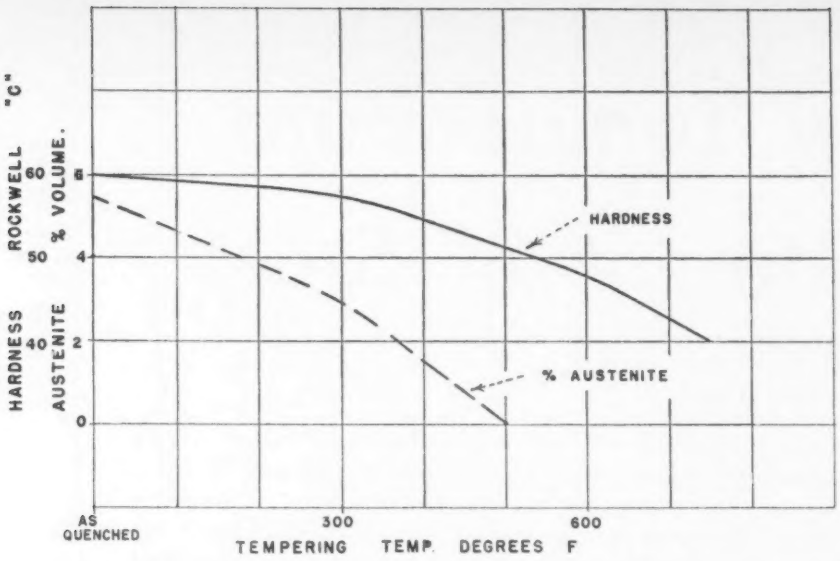


FIG. 18—Chart showing effect of tempering on hardness and transformation in C-1045 steel.

is nonmagnetic, while the products of transformation are magnetic. In the case of carburized steels, where the carbon content varies over quite a wide range from the surface to the core, an entirely different set of conditions is encountered. Any measurements involving the above principle would merely show the amount of existing austenite in the whole test piece and would give no accurate determination as to the distribution. It would, of course, be logical to assume that most of the retained austenite would be within the hypereutectoid case zone.

For this class of steels it becomes necessary to resort to hardness tests and microscopic studies in order to determine the amount of transformation. Fortunately these methods are much easier and tend to show more accurate results when applied to the carburizing steels, as compared to the higher carbon types previously discussed. Since it has long been known and agreed that the carburizing steels, containing appreciable percentages of nickel, tend to retain high percentages of austenite after carburizing and hardening, three types with vary contents of nickel were selected for study. These three are: (1) E-4620 containing 0.18 pct C, 1.76 pct Ni and 0.25 pct Mo, (2) E-2512, a straight nickel alloy containing 0.13 pct C and 5.00 pct Ni, and (3) E-3316 a nickel-chromium alloy containing 0.15 pct C, 3.60 pct Ni and 1.60 pct Cr.

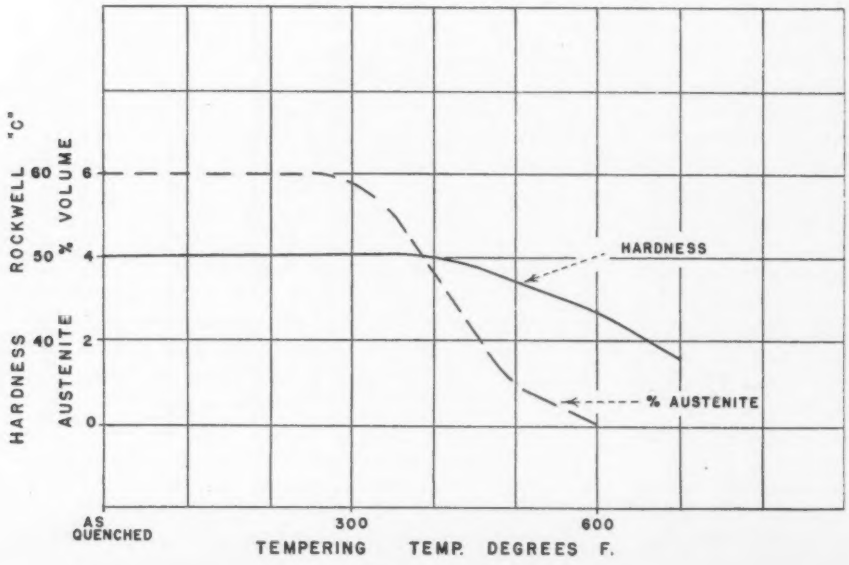
Samples of all three types were gas carburized at 1650°F, so that a case depth of approximately 0.040 in. was obtained on all specimens. They were diffused in a furnace for 1 hr and quenched in oil from 1650°F. The next step was to cut the specimens so that one face could be used for hardness measurements without any stock removal, except for polishing, subsequent to heat treatment. Since measurements made by means of the Rockwell "C" scale are really taken at some distance beneath the surface all hardness readings were taken with the Superficial Rockwell tester using the "15N" scale.

Fig. 20 is a chart showing the hardness values of the three types of steel. The hardness values are shown as "C" scale readings although they were taken with the "15N" and converted to "C" by use of the standard Rockwell conversion chart. The cross-hatched columns show the hardness values for the specimens after the treatment described above, while the plain columns show hardness values for the same specimens after they had been subjected to −125°F for 1 hr.

As may be readily observed, the low temperature effected a substantial increase in the hardness of all three types. As might logically be expected, the transformation or hardness increase was much greater in case of the higher alloys—the 3316 type in particular. It must be remembered that these readings are superficial and that the percent of retained austenite does decrease as the distance from the surface increases, so that in few if any cases could actual Rockwell "C" readings be taken which would show such a marked difference as is shown on this chart.

Many microscopic studies have been made on these alloys, a few of which are shown here. Fig. 21 is a photomicro-

FIG. 19—Chart showing effect of tempering on hardness and transformation in C-1137 steel.



graph taken of the case structure, 0.002 to 0.004 in. under the surface of a 4620 steel (A) after quenching from the carburizing temperature, and (B) after treating at −125°F. There is obviously some transformation but no phenomenal amount. There is no great hardness increase shown in this type. Fig. 22 shows photomicrographs also taken of the E-2512 specimens. Fig. 22A shows the structure after quenching to room temperature from the carburizing furnace and fig 22B is the same specimen after having been treated at −125°F. The transformation effected by the cold treatment is considerably more noticeable in this type, and is borne out by a greater change in hardness.

Fig. 23 shows the microstructures of E-3316 before and after low temperature treatment, respectively. The transformation as shown by the photomicrographs, as well as the drastic increase in hardness, shows quite clearly that the low temperature treatment is more effective on E-3316 than either of the other types of carburizing steels.

One question frequently asked is—How long is it necessary to hold parts at the low temperatures in order to gain all possible benefit? Fig. 24 is a chart showing time at −125°F plotted against percent of transformation. For these data the author used a large number of test specimens made of an alloy from which (by austenitizing at an abnormal temperature) about 22 pct transformation could be effected by treating at −125°F.

The specimens were first measured at room temperature and then subjected to −125°F in a medium of air. Specimens were removed from the low temperature in 5-min time intervals for ½ hr and then at longer time intervals, for the period shown on the chart, returned to room temperature, measured and discarded. All of these specimens were ½ in. in diam and 2 in. in length. It is evident from a study of this chart

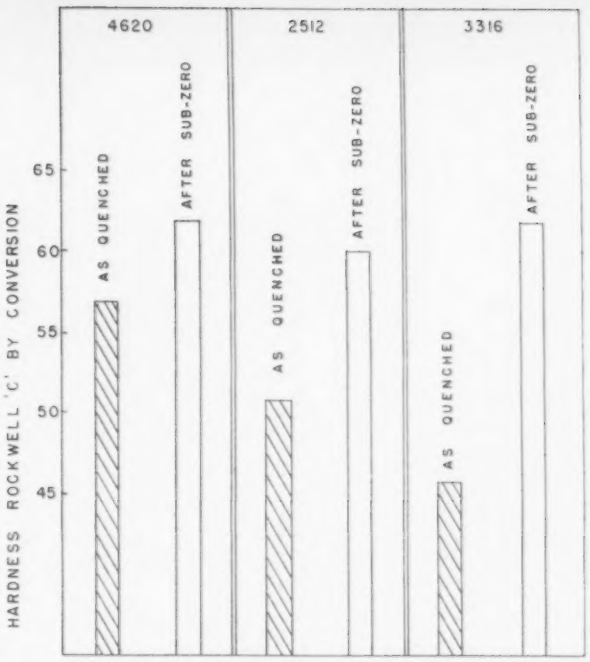


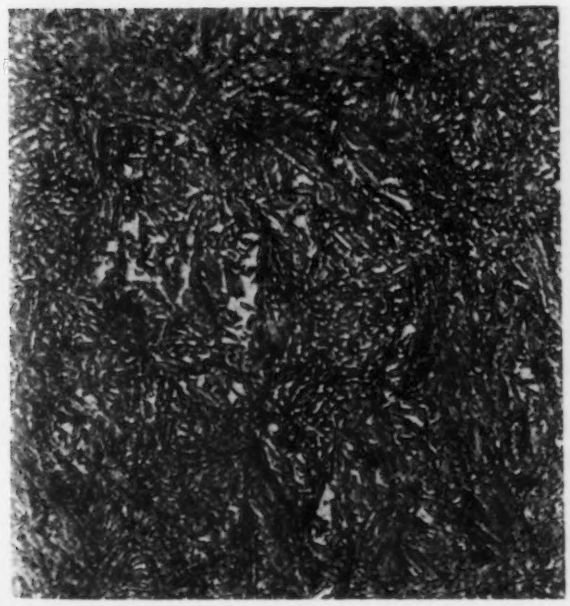
FIG. 20—Effect of low temperature treatment on surface hardness of carburized alloy steels.

that transformation has been completed for a given temperature in just about the length of time required for all sections of the work to assume the low temperature. Since this chart shows that a ½ in. diam specimen has completed transformation in 30 min surrounded by still air, one might assume the minimum time to be 1 hr per in. thickness of the maximum section. A longer time at the low temperature is not in any way harmful. If a medium of liquid is used in the low temperature chamber instead of air, the holding time is naturally lessened.

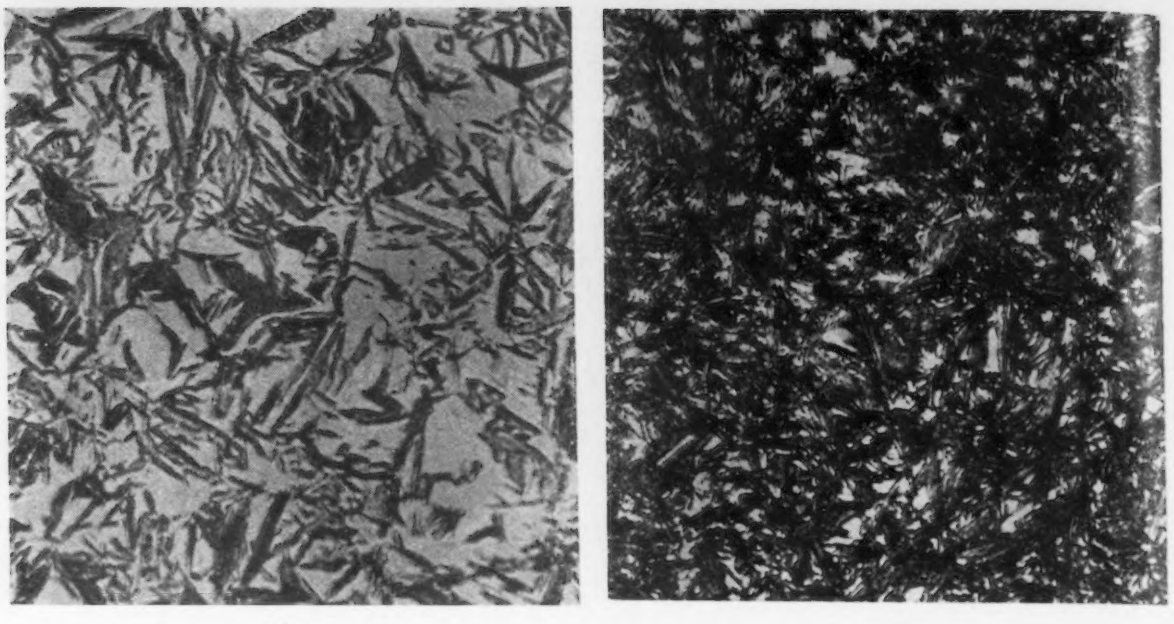
Another common question asked in regard to

FIG. 21—Case of E-4620 steel (A) after quenching from 1650°F and (B) treated at —125°F. 1000X.

—A—



—B—



—A— —B—

FIG. 22—Case of E-2512 steel (A) after quenching from 1650°F and (B) treated at —125°F. 1000X.

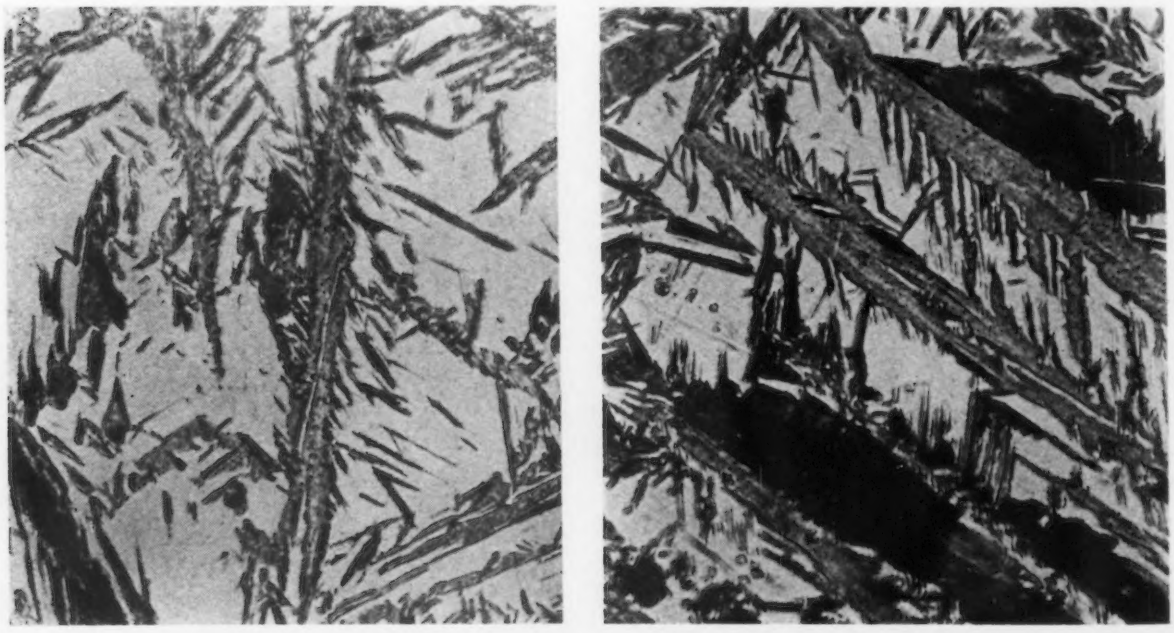
low temperature treatment is—How soon should the work be subjected to the low temperature after the quench? To answer this question one can safely say that the period of time the work is allowed to remain at room temperature between these two operations is not critical. Austenite does tend to become stable at room temperature after long periods of time so that it is always advisable to carry out the low temperature treatment as soon as possible after the quench.

Fig. 25 shows some interesting data in regard to the effects of a time elapse between the quench and the low temperature treatment. For this test, specimens of type E steel, air cooled from 1950°F, were used. As noted before this steel austenitized in such a manner will retain about 45 pct austenite at room temperature, and this amount will decrease to about 36 pct after low temperature treatment. These specimens were allowed to remain at room temperature for the time intervals as shown varying from 1 hr to 1 month. It is interesting to note that at the end of 1 month the low temperature was less than half as effective compared to using it within a few hours after the quench.

Another question which has stimulated a great deal of discussion is that whether or not the practice of tempering after the quench and prior to using the low temperature will seriously im-

FIG. 23—Case of E-3316 steel (A) after quenching from 1650°F and (B) treated at —125°F. 1000X.

—A— —B—



pair transformation at low temperature. It may be noted that for the entire project described in this article, the specimens were cold treated after the quench and prior to any tempering operation. It has been the experience of the author that any tempering prior to cold treatment does tend to lessen the ultimate effect. In case of the steels which are tempered only in the relatively low temperature range (300° to 350°F), the effect on the function of a subsequent low temperature treatment is slight, so that usually for practical purposes it does not matter in which sequence the operations are performed. For the alloys which are tempered in the higher ranges of 900° to 1100°F, the effect on transformation from a subsequent cold treatment is far greater. It has been the author's experience that a cold treatment applied to steels after having been tempered in the range just mentioned, is usually less than one half as effective, compared to results obtained from employing the low temperature treatment immediately after quenching.

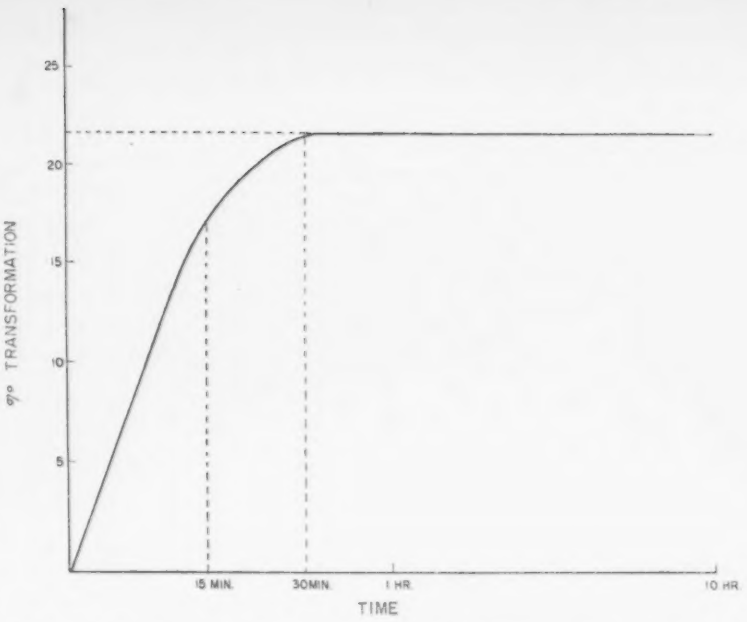


FIG. 24—Time required for transformation in ½-in. round test specimens at —125°F.

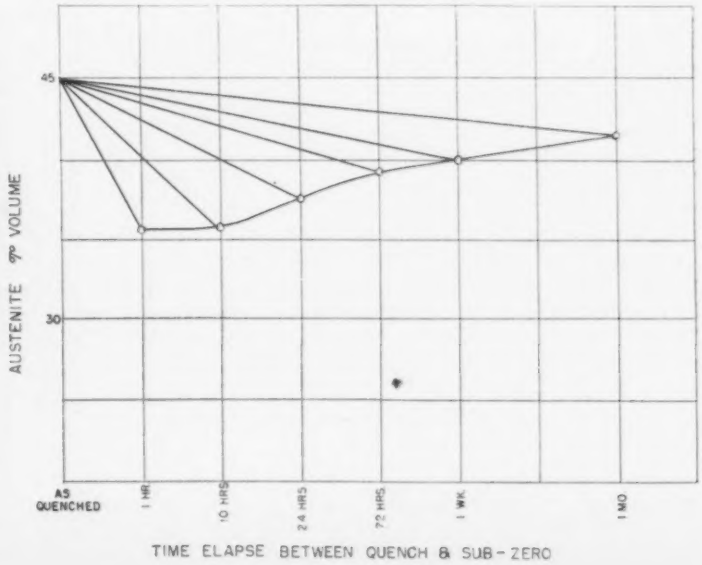
As to whether or not more than one cycle of cold treatment is of any benefit, this is still somewhat of a question. Some tests made by the author show absolutely no effects from a second or third cycle at low temperature, while in other cases some small percentages of transformation have been obtained. Due to the amounts having been so small they have been regarded as being within the limits of experimental error. At least it seems logical to state that the small amounts, if any, of transformation that will be effected by multiple cycles of low temperature treatment would be of no practical value.

Another question that is frequently asked, is in regard to the possibility of cracking of parts, particularly when they are subjected to the extremely low temperatures without any tempering. To this question the author can make only a general answer. There is danger in certain cases of suddenly subjecting highly-hardened parts to the low temperature. As far as the author has been able to determine, cracking will not occur from thermal shock, but rather from the stresses set up by the volumetric changes which take place during the transformation to martensite, as effected by the low temperature. In other words the conditions encountered are comparable to tempering the high alloys too rapidly.

No doubt it has been the experience of many that a high alloy steel, such as types C or D, will frequently be found cracked after tempering, when it was absolutely sound after the quench. This is particularly true if the steel has been austenitized at abnormal temperatures, thus allowing a high percent of transformation to take place during tempering. The author has experienced little cracking in any types, when the cooling was done in a medium of air. It is logical that the rapid transformation encountered by immersing work in liquid held at extremely low temperatures would be more likely to result in cracking.

The author has never encountered any cracking in applying low temperature treatment to the low alloy or carburizing steels. It becomes a matter of judgment and of using precaution when low temperature treating the high alloys, which should be practiced in the whole heat treating cycle anyway, if optimum results are to be obtained. It is definitely recommended that if the high alloys must be cold treated in liquid some arrangement be made for the cooling to be

FIG. 25—Effect of time elapse between quench and low temperature treatment.



done in two or more steps. Charts shown earlier in this article can be used as working data, so that the operator will have a fair idea how much transformation can be expected and thus predict the susceptibility to cracking.

It is obvious that low temperature treatment used on steel is only capable of transforming a certain percent of retained austenite in hardened steels. The main reason given for obtaining as nearly as possible a 100 pct transformation is to obtain higher hardness values, though another good reason is to obtain dimensional stability, which is of great importance to many manufacturers. Whether or not low temperature treatments will be of benefit is dependent mostly upon the type of steel and the particular application.

In closing, it might be in order to call attention to a couple of typical applications where low temperature treatment has been of great value. One is in case of the high carbon-high chromium dies which are not normally tempered at high temperatures. Another application in which low temperature treatment has been found quite useful is for parts made of the high alloy carburizing steels such as 2512 and 3316. In many parts, such as gears, it is not only desirable to have a high hardness as measured by the penetration method, but also to have them file-hard and free from the highly austenitic surface or "soft skin." As shown by data in this article such steels as just mentioned do respond readily to treatment and subsequent improved properties by low temperature treatment.

Milk and Rest Periods Boost Productivity, Cut Accidents

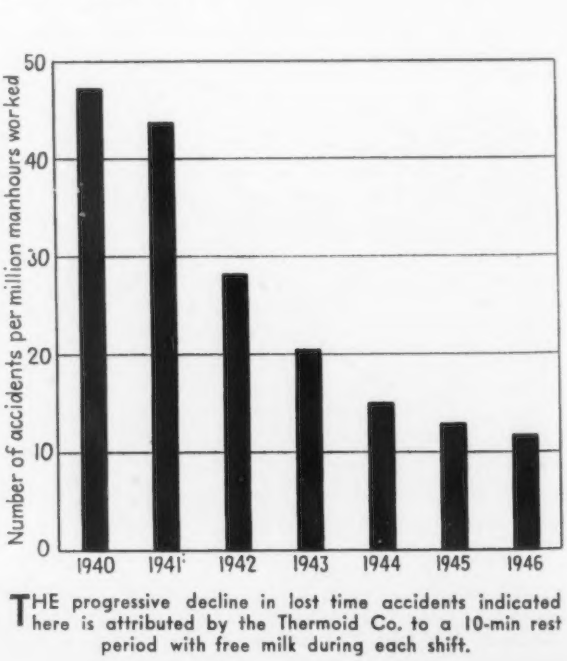
o o o

AN EXPERIMENTAL program instituted to improve employee productivity during the war by providing rest periods with free milk just before the peak fatigue point was reached on each shift has produced such an impressive increase in productivity per worker and reduction in accident frequency that the program is being continued even at the expense of a monthly milk bill of about $2000.

Thermoid Co., Trenton, N. J., manufacturers of automotive brake linings, industrial belting, molded rubber and plastic products, introduced the program just before the war in 1941 on an experimental basis. At first, a 5-min break with a half pint of milk was given on each shift at a time just before the estimated peak of fatigue was reached. This period has since been extended to 10 min and is given on the 7 to 3 shift between 9 and 10 a.m.; to the 3 to 11 shift around 8 p.m. and to the 11 to 7 shift at 4 a.m. In the office departments the period is given in the afternoon. Total plant employment averages 1800.

Lost time accidents, as shown in the accompanying chart, have steadily declined from a high of 47.2 per million manhours worked just before inception of the program in 1940 to 11.6 in 1946.

During the first year of operation the number of days lost by accidents dropped 35.7 pct. Increased productivity per worker has been estimated at from 5 to 8 pct and during the hour following this period, gains as high as 15 pct have been recorded in some departments. Present popularity of this system is indicated by the fact that although when the program was initiated, a significant percentage of employees turned down the offer of free milk practically every employee in the plant now consumes his quota and during a 6-week strike of container suppliers, employee restlessness and inefficiency increased sharply. The company also asserts that a decline in the incidence of lost time due to sickness, particularly during the winter months, has been noted. Labor turnover on the day shift in particular has also decreased. Summing it up briefly, the company feels that the program has been entirely satisfactory to both management and labor and the overall efficiency increase has more than repaid the cost.



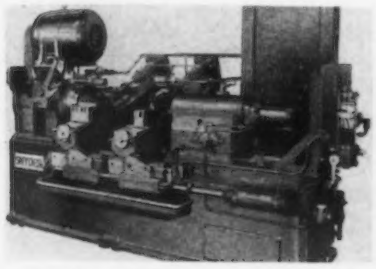
THE progressive decline in lost time accidents indicated here is attributed by the Thermoid Co. to a 10-min rest period with free milk during each shift.

New Equipment . . .

Special automatic and vertical spindle lathes, a continuous cycle thread milling machine, screw slotters, a special purpose assembling machine, a hydraulic openside shaper and a dc welding generator are featured this week. Also described are mandrels, lift hooks and safety pliers for die work, single phase motors, a metallizing gun, and safety goggles.

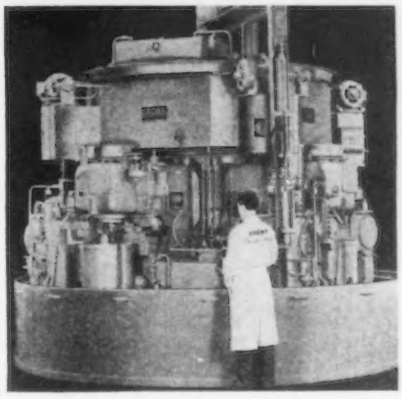
Automatic Lathe

AN automatic lathe has been designed and built by *Snyder Tool & Engineering Co.*, 3400 Lafayette, Detroit, with the primary objective of increasing production on turning operations by incorporating the newest developments in clamp-on, round, triangle and other shaped carbide cutting tools. High speeds and feed can be maintained due to heavy and rigid construction and a center drive unit and an overhead facing slide can be added at any time. Hydraulic feeds and wide adjustments on all slides permit a considerable range of parts to be machined with changeover time held to a minimum. The machine, illustrated, is tooled for turning and facing automotive rear axle shafts and in one operation finishes all diameters and faces to size. It is equipped with two turning carriages, two facing slides, and hydraulically operated quill type tailstock. All feeds are hydraulic and adjustable by dials for each attachment. Spindle speeds are controlled by pick-off gears. Moving parts are automatically lubricated. Output is 75 to 80 pieces per hr.



Thread Milling Machine

A FOUR-STATION, continuous cycle machine for thread milling oil well joints, requiring only one operator has been developed by *Cross Co.*, Detroit 7. The machine sets the pace for the operator who merely unloads, loads, and presses a button. Power rapid traverse then automatically positions the work with the cutter. The entire machine rotates, the stations coming to the operator one at a time as the parts are completed. Four pieces of work are finished with each revolution of the machine. A Servo-controlled hoist lifts the parts in and out of the hydraulically operated chucks. Rough and finish cuts are taken at the same chucking. Infeed, outfeed, and taper are cam controlled. Precision bearings, large flywheels on the cutter spindles, preloaded work spindles, and climb milling are responsible for the high cutting speed of 300 surface fpm, with high-speed steel hobs.

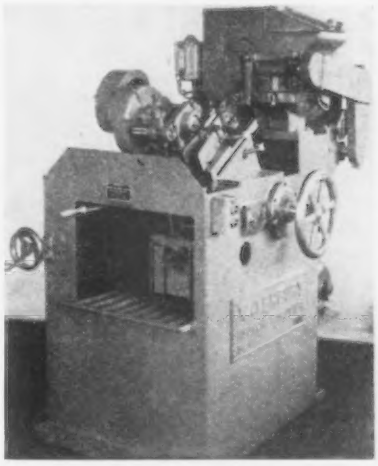


Oxyacetylene Welding Torch

SUITABLE for almost any welding job from the thinnest sheet metal up to 1½ in. in thickness, an oxyacetylene welding torch, the Airco 800, has been made available by *Air Reduction Sales Co.*, 60 E. 42nd St., New York 17. Although the torch has a conventional weight of 1½ lb and is only 11½ in. long, it has a capacity of operating single flame welding tips from Nos. 0-13 as well as multiflame tips up to No. 15. Each welding tip is assembled with an individual mixer drilled for that particular size tip thus assuring better flame controls and weld results. A smaller torch, Airco 700, uses welding tip assemblies sizes 0-10 inclusive.

Screw Slotters

SCREW slotters with capacities for machine screw sizes from No. 2 to ½ in. diam have been announced by *Waterbury Farrel Foundry & Machine Co.*, Waterbury, Conn. The intermediate machines, Nos. 0 and 1, are now built with welded steel frames, improved hopper feed, twin-cutter burr remover, and infinitely variable production speeds. The No. 0 machine, illustrated, has a production rate of from 40 to 125 screws per min; the No. 1 is rated at from 20 to 80 screws per min. The hopper from which the screws enter the feed chute, is equipped with a rotor having pockets which pick up the screws and deposit them into an inclined chute. A carrier dial is notched to receive the blanks one at a time and is indexed counterclockwise to carry them to a position directly under the saw. While in this upright position, the screws



are firmly clamped during the slotting operation. Change gears can be furnished to provide 17 different speeds, three of which are included as standard equipment. The depth of slot and the total feed stroke are regulated by means of two hand knobs. The machines are motor-driven and are started by a push-button switch and a hand-operated clutch lever.

Hydraulic Oil Pump

DESIGNED for 1000 psi service in industrial applications, a gear type hydraulic pump manufactured by *Adel Precision Products Corp.*, Burbank, Cal., is available in various models with rated capacities at 1800 rpm, from 1.5 to 60 gpm. A special seal used on the drive shaft is claimed to assure leakproof action and eliminate packing difficulties. A ball bearing on the shaft has been incorporated to absorb thrust and radial loads imposed by the drive. Gears are keyed to the shafts through a ball drive developed to permit the gears to float endwise. This design is said to prevent thrust loads from being transferred from the shaft to the gears or end plates. Fluid trapped in the pumping gears is used to pressure lubricate shafts, bushings and bearings. Pumps are internally drained.

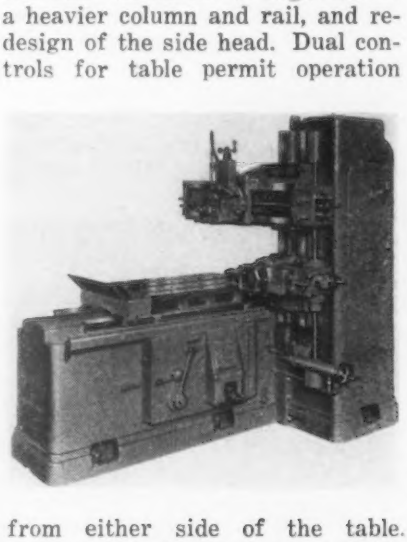
Assembling Machine

PRODUCTION of a special-purpose, automatic cycle machine for assembling the packing washer onto the groove in hydraulic brake pistons has been announced by *Snyder Tool & Engineering Co.*, 3400 Lafayette, Detroit. The machine employs a continuously re-

volving, variable speed table which is driven through a spur gear and worm gear transmission with a 2-hp motor. Rotation speed can be changed by means of accessible pick-off change gears. Two operators load brake pistons into the 20 automatically operated collet fixtures mounted on the table and place packing washers in front of each piston. As the table revolves, collets automatically close, clamping the piston and a spreader finger forces the washer into place on the piston. As the assembly leaves the spreader finger, collets open automatically and the assembly is ejected into a discharge chute. The automatic work cycle is timed for completion of 50 assemblies per min.

Openside Shaper

RANGE of application of the Hy-Draulic 36-in. openside shaper manufactured by *Rockford Machine Tool Co.*, Rockford, Ill., has been extended through use of a heavier column and rail, and redesign of the side head. Dual controls for table permit operation



from either side of the table. Power rail elevation is available as extra equipment, to further simplify setup work. Safety devices are incorporated in the stop and start lever assemblies to prevent accidental starting of the table. Infinite speed selection is provided on this model.

Vertical Spindle Lathes

DESIGNED for general secondary finishing operations, such as deburring, filing, or polishing metal and plastic parts, where because of the form of the part to be finished or the nature of the finishing operation, it is advantageous to revolve the work piece in a horizontal plane, vertical spindle variable speed lathes have been developed by *Schauer Machine Co.*, 2062 Reading Rd., Cincinnati. The speed lathes are available in a variety of designs, either manually or air-operated, and arranged for various types of holding devices, including standard 3-jaw lathe chucks, air-operated chucks, collets,

expanding mandrels or special holding fixtures. Infinitely variable spindle speeds are provided, from a high of 4800 rpm to a low of 100 rpm, in a 6 to 1 ratio when using a single-speed motor, or 12 to 1 when using a two-speed motor. The lathes feature a continuously operating motor, and automatic chuck and brake.

Grinding Fixture

A SPECIAL face plate mandrel has been incorporated in a grinding fixture manufactured by *Erickson Tools Div.*, 2309 Hamilton Ave., Cleveland, to hold the major diameter of an Acme thread on the ID. The mandrel, drawbar-operated, is equipped with locators. Unusual requirements can be met by custom building variations such as this, into Erickson precision expanding mandrels.

Flow Testing Kit

TO meet the varied flow measurement requirements of the research laboratory, a flow measurement set has been announced by *Fisher & Porter Co.*, Hatboro, Pa. It consists of a metering tube holder with base plate and hose connectors, four interchangeable tubes and six metering floats complete with calibration data. Capacities from 0.065 to 2200 cc/mm of water and 5.0 to 36,800 cc/mm of air are covered.

DC Welding Generator

A 300 amp bare welding generator having a welding service range of from 30 to 375 amp is offered by *Harnischfeger Corp.*,

4400 W. National Ave., Milwaukee 14. Called the model WG-300, it is designed for easy coupling to a gasoline engine or power take-off.

A V-belt pulley arrangement makes exact alignment between power and generator unnecessary. The unit has one control for any desired welding heat within the machine's entire range. P&H's Visa-matic calibration plate permits instant selection of the correct welding current for all classes of electrodes.

Troughing Idlers

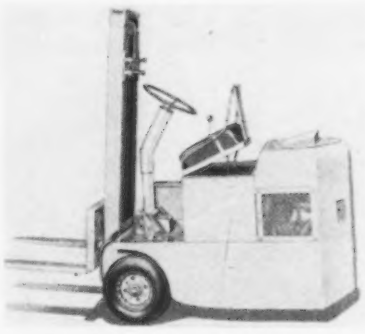
A NEW adjustable conveyer belt troughing idler has been announced by *Koppers Co., Inc.*, Pittsburgh 19. Outer inclined pulleys are adjustable from slightly above the horizontal up to an angle of 25°. All idler pulleys are located in the same vertical plane and the adjustment of the outer pulleys is accomplished in a manner which maintains a constant gap between the ends of the horizontal and inclined pulleys. With the new design it is said to practically tailor-make the idler installation to fit the conveyer belt. A suitable number of adjustable idlers can be used to form a vertical curve and provide the shallowest depth of trough necessary to retain the material without spill, it is pointed out.

Temperature Controllers

A SERIES of temperature controllers, announced by *K. H. Huppert Co.*, 6830 Cottage Grove Ave., Chicago 37, are designed for use with electric and gas heating units. These stepless input controllers are available with or without pyrometers and are recommended for use in electric and gas furnaces, ovens and pots. In operation, a small portion of current is allowed through the heating elements, an amount sufficient to maintain definite temperatures. Gas equipment is controlled through a solenoid valve. Model IF weighs 5¼ lb, is equipped with a pyrometer calibrated to 2000°F. Where pyrometers are not required, Model IF 2 is available. This weighs 3¾ lb. Models operate on 115 v ac.

Fork Truck

ADDITION of a 2000-lb fork lift truck to the Chore Boy line of material handling equipment has been announced by *Buda Co.*, Harvey, Ill. The truck, known as Thrifty Lift, is powered by a twin cylinder 4 cycle air cooled gasoline engine which develops a maximum of 10 hp. Lift and tilt mechanism is hydraulic. The unit, available in lifts of 7, 8 or 9-ft heights, may be changed from forward to reverse



without the operator touching gearshift lever. Length, less forks, is approximately 634 in., width 32 in. and outside turning radius, 59 in.

Hard Surfacing Electrodes

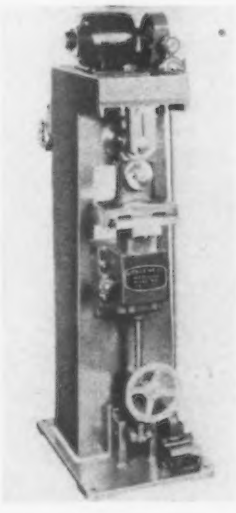
FOUR electrodes in the P&H Hartop series marketed by *Harnischfeger Corp.*, 400 W. National Ave., Milwaukee, cover the Rc range from 35 to 63, as deposited. Hartop Brown provides 35 to 40 Rc and is for welds subject to angular shock and abrasion. The Green is designed for high resistance to impact and abrasion and is said to provide strong bonds on carbon and alloy steels, manganese steels, and cast iron. Rc is 45 to 50. Hartop Red is for severe impact and abrasion, with high resistance to shattering impact. Rc is 50 to 55. The Yellow electrode with Rc of 58 to 63 has been developed to resist abrasion and deformation caused by weight and impact. Arc stability is claimed for all four. Each type is packed in 5-lb moistureproof tubes.

Single-Phase Motor

A SINGLE-PHASE Life-Line capacitor-start, induction run, squirrel cage motor is available from *Westinghouse Electric Corp.*, Pittsburgh 30, in ratings of ¾, 1, 1½, 2, 3, 5 and 7½ hp. This motor, designated Type CAP, utilizes the capacitor for starting only. The starting switch or relay disconnects the capacitor as the motor approaches full speed and the unit then operates as induction run motor. The motor is said to be suited for most single-phase applications, including air conditioning, reciprocating and centrifugal pumps and machine tools. Motors are available for the following ratings: 60, 50 and 25 cycle, single-phase, 110/220 v dual voltage, 110 or 220 v single voltage; 3450, 1750, 1160 rpm for 60 cycle, 2875, 1475, 970 for 50 cycles and 1450 rpm for 25 cycles.

Marking Machine

DESIGNED for graduating and marking round parts such as dials for machine tools, a new model power operated graduating and marking machine of welded steel construction has been placed on the market by *Noble & Westbrook Mfg. Co.*, East Hartford, Conn. The ma-



chine is equipped with a pneumatic cylinder, pressure regulator, and foot control for providing table pressure for bringing the work up in contact with the marking die. The air pressure controls the depth

of the mark. The spindle on which the marking die is mounted is operated by a motor at the top of the machine. An adjustable knee or table support can be raised or lowered for various dial diameters. Dials ranging up to 8½ in. in diam can be graduated and marked. Beveled dials up to a 30° angle can be graduated by using a special fixture.

Lift Hook

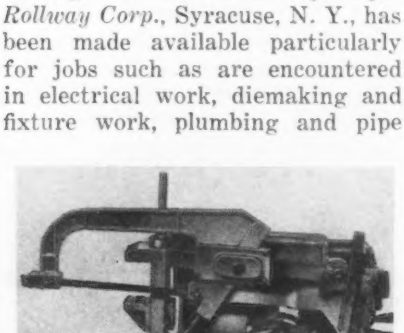
LIFT hooks forged from chrome-nickel steel for handling dies and heavy objects are now available from *Johnson & Jennings Co.*, Cleveland 14. The bolts have a knurled ring for hand turning and are fabricated from chrome-vanadium steel. Self-cleaning threads are ground after heat treating and bolts are Magnaflux tested. In this design, bolt and hook form a complete unit. Rated capacity ranges from 3 to 15 tons.

Safety Pliers

SOFT nose pliers for feeding power presses have been developed by *Safe-Play Co.*, 2921 N. Cicero Ave., Chicago 41. The tool weighs less than 5 oz and holds small parts securely by pressure from a spring in the handle. The operator grips the handle to open the jaws. Replaceable jaws are straight aluminum alloy bars which are shaped cold in the user's plant to fit the small part to be handled.

Power Hack Saw

THE Hand-I-Hack, a lightweight portable power hack sawing machine made by *Lipe-Rollway Corp.*, Syracuse, N. Y., has been made available particularly for jobs such as are encountered in electrical work, diemaking and fixture work, plumbing and pipe



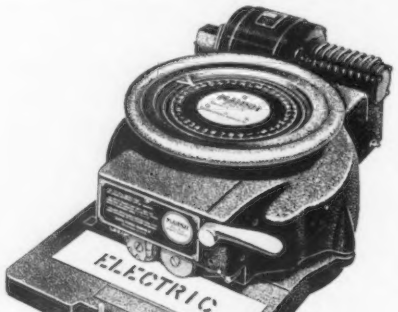
fitting, and small machine shops. The saw is adjustable for cutting in a range from solid tough materials to thin-wall tubing. The work holding vise capacity is 3x3 in. and the vise is designed to hold 2½-in. iron pipe. The vise is swivel mounted and calibrated for cutting accurate miters. Sawing may be done in any position. The unit operates on 110 v ac current.

Metallizing Gun

TURBINE construction which makes possible the use of a small compressor is one of the features claimed for the Model L light duty, low air gun announced by *Metallizing Engineering Co., Inc.*, 38-14 30th St., Long Island City 1, N. Y. The gun requires 10 cu ft of air per min and acetylene and oxygen consumption is claimed to be reduced through nozzle design. One adjustment is employed for the range of metallizing wires. This gun, which weighs 4 lb 2 oz has been designed for spraying all types of metals by hand or machine.

Electric Stencil Machine

FOR cutting stencils in oiled stencil board or plain cardboard for marking stencil addresses on shipment of goods, a machine has



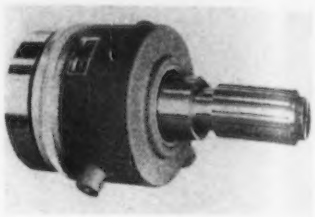
been developed by *Marsh Stencil Machine Co.*, Belleville, Ill. Perfect stencils are cut with effortless movement and amazing speed, it is claimed. The machine, of advanced design and sturdy construction, is made in three character sizes, ½, ¾ and 1 in. Power is supplied by a standard 1/6-hp motor, which can be plugged into any light socket.

Barrel Skid

INTRODUCTION of a magnesium skid weighing only 33 lb with a capacity load of 800 lb has been made by *Wellman Bronze & Aluminum Co.*, 6020 Superior, Cleveland. This 9-ft skid enables easy, safe, rapid handling of all type barrels, it is said. Cast hooks and shoes are replaceable.

Air-Operated Mandrel

BY combining a precision mandrel and air cylinder, a special double sleeve air-operated mandrel has been designed by *Erickson Tools Div.*, 2309 Hamilton Ave., Cleveland 14. Steel tubing with ID within the range of 2½ to 3 in.



is held automatically for straddle-facing and turning operations. The Erickson air chuck principle is utilized to actuate a special drawbar mandrel. By removing the mandrel assembly and substituting two simple standard air chuck parts the fixture can be quickly converted to a standard type air-operated collet chuck.

Foundry Safety Goggles

RECOMMENDED for protection against impact hazards commonly encountered in such foundry work as melting, pouring, chipping, grinding, hand tool operations and machine operations, foundry safety goggles have been made available in two sizes by *American Optical Co.*, Southbridge, Mass. A corduroy binding extends around the entire edge of the leather mask for extra comfort and fit. The goggle is made in two sizes, large and small and is available with super armorplate or 6 curve super armorplate lenses, clear or Calogar in medium, dark or extra dark shades. Wire screen ventilators surround the eyecups, providing extra large area of ventilation to help keep lenses from fogging.

Conveyer Table

BUILT to a rigid standardization of parts which are interchangeable, the Unitized conveyer table has been manufactured by *Island Equipment Corp.*, 101 Park Ave., New York 17. The apron can be attached to either side of the conveyer belt. Tables, which can be coupled together to form as long a unit as desired, are available in different lengths and 11 widths. The belt is motor-driven by the company's Pakage power unit.

8 DRAWS-NO ANNEALS-MAKE MOTOR CASE

SEVERAL different types of Revere Metals go into the making of the famous Telechron Electric Clocks. They include copper, brass, and commercial bronze or "gilding metal." Each type is most carefully selected to match the strict requirements of fabrication and operation. In making those selections, and in working out the most favorable manufacturing methods, Revere and Telechron collaborated closely and effectively.

Take the motor case, which involves a deep draw in a relatively small part. The metal must not only be suited for this operation, but must be non-magnetic, since the lines of force from the motor's electromagnet must penetrate the case in order to operate the motor. Naturally, a copper alloy was indicated—but *which?* Telechron had eyelet-type press tools designed and built for the eight drawing operations. The Revere Technical Advisory Service was called in when unexpected production difficulties arose. Through a mutual study, these difficulties were entirely eliminated by specifying Revere Commercial Bronze, 95%, and by making other changes. No anneals are now required to produce the case. Production was stepped up, rejects reduced, marked economies obtained . . . Revere will gladly cooperate with any manufacturer faced with problems in the non-ferrous metals.

• • •

REVERE PRODUCTS: *Copper and Copper Alloys:* Sheet and Plate, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings. *Aluminum Alloys:* Tube, Extruded Shapes, Forgings. *Magnesium Alloys:* Sheet and Plate, Rod and Bar, Tube, Extruded Shapes, Forgings. *Steel:* Electric Welded Steel Tube.

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Assembly Line . . . .

WALTER G. PATTON

• Kaiser-Frazer reveals its light metals program . . . Aluminum gas tanks, magnesium wheels and diecast door frames show promise . . . K-F executive advocates tax law revision.

DETROIT—As the champion breaker of bottlenecks and probably the least "die-bound" producer in the auto industry, Kaiser-Frazer has earned the right to speak about traditional fabricating practices of the auto industry. K-F's new look at the materials situation is in many respects the most significant document released by the industry in months; it is a report any steel executive can read with profit if he is looking seriously for an answer to the question: to what extent will aluminum and magnesium eventually replace steel in automobiles?

In his recent remarks before the Cleveland Chapter, American Society of Tool Engineers, Clay Bedford, vice-president in charge of manufacturing of K-F, made it clear that the engineers at Willow Run pulled out all the stops in an effort to get aluminum and magnesium into K-F cars. Among other things, Mr. Bedford makes two things plain: (1) What has been learned about light metals is undoubtedly more important than the number of substitutions made thus far, (2) if fabrication costs and steel costs continue to rise (as everybody expects they will), aluminum and magnesium will undoubtedly play an increasingly important role in automobile construction.

As a result of its extensive experiments, K-F plans to go into production on aluminum gas tank early in March. It is currently testing a magnesium wheel weighing 8 lb as a possible substitute for a steel wheel weighing 18½ lb. K-F also has a set of dies ordered for making rear door frames using a diecast inner frame that will be hemmed to a standard steel outer panel. Production runs of this item are scheduled for June.

In addition, K-F has looked into the possibility of aluminum decklids, instrument panels, hoods and many other parts that might conceivably utilize aluminum or magnesium rather than steel.

The conclusions of the K-F engineering staff on many small auto parts are not disclosed in Mr. Bedford's talk. However, the results achieved in major tonnage items like doors, wheels and gas tanks permit the assumption that these items are not being overlooked.

Mr. Bedford confirmed reports that even before production got under way at Willow Run, Kaiser built a car with an aluminum body, but it proved too expensive. "We had trouble with loose metal in doors, and 'oil-canning' of the surfaces. We found welding to be slow. We found that our bonderizing setup for steel bodies was not applicable to aluminum in its present form. But we found that the building of these pioneer aluminum automobiles stimulated new ideas as to methods which might be employed to solve the problem of how to use light metals as a substitute for steel in automobile manufacturing."

AS Kaiser-Fraser was able to increase its steel supplies the company continued its search for practical application of light metals "but with less urgency."

Bedford explained that the possibilities of diecasting have been thoroughly investigated at Willow Run. "Our first attempts at diecasting convinced us that it was not sufficiently advanced to provide thin sections with surfaces which would be suitable for the outer skin of an automobile body." Although perfectly feasible from an engineering standpoint, Willow Run engineers found that aluminum hoods or decklids were too costly compared with steel at present prices. K-F engineers also tried out glass cloth reinforced plastic hoods, but again the cost was too high in competition with present methods.

After much searching, it was determined that the gas tank was the largest part that could be made competitively from aluminum sheets. "This was partly due to the high cost of terne plate, but it was also due to the fact that we anticipated being able to make a practical gas tank with a minimum of welding," Mr. Bedford said.

He disclosed that K-F is now tooling up to produce one-third of its gas tanks from aluminum. A seam will be substituted for most of the welding, and the aluminum tank will weigh 11 lb as compared to 28 lb for the terne plate product.

According to Mr. Bedford, light metal wheels offer important advantages from the standpoint of reduction in tire wear, improvement in riding quality, and labor saving in fabrication. The use of die cast magnesium tail wheels on large bombers during the war pointed to a rapid development.

"We have had sand cast magnesium wheels operating successfully on our test cars for several months," he said. "Die cast magnesium wheels are going through fatigue tests, as well as strength and corrosion tests, and tests for life of lug bolt holes. While magnesium wheels are uneconomical for mass production at present labor rates, any further increase in fabrication labor costs or increases in the cost of steel or reduction in cost of magnesium

Competition Ahead!

Bring the P&W Engineer into your Toolroom Picture

Labor's up! Material's up! Competition looms on both price and quality. Manufacturing survival and jobs depend on meeting it. What to do? Here's one thing . . .

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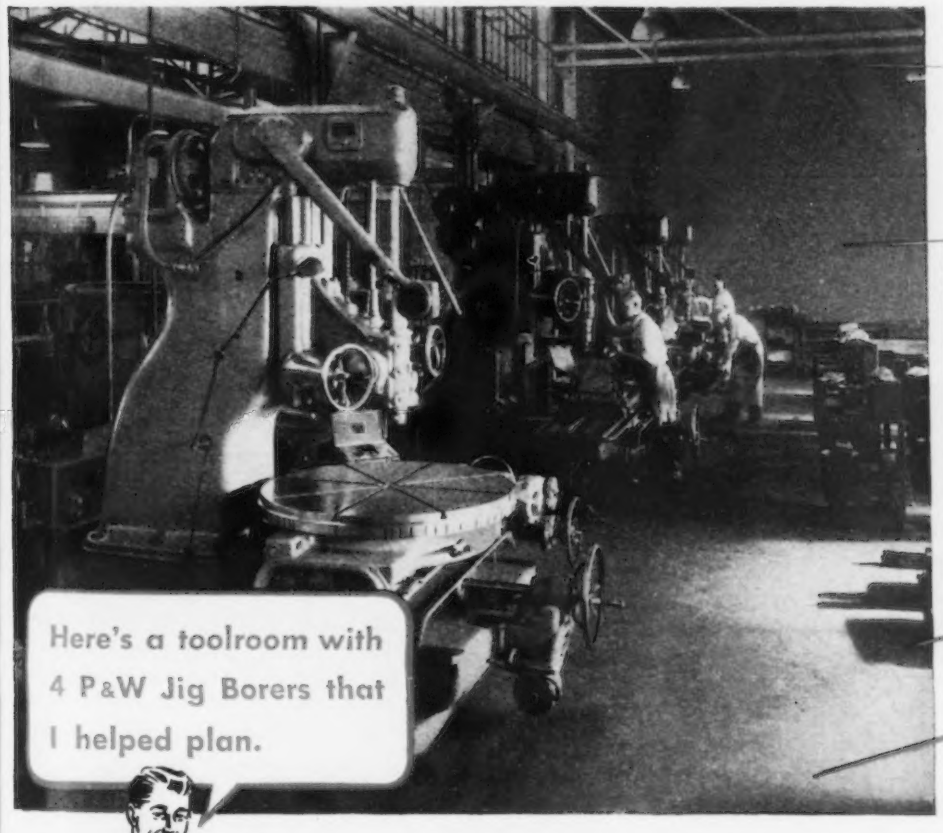

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT

will make them economically practicable," Mr. Bedford commented. The use of magnesium wheels would reportedly save 42 lb per car.

BELIEVING that diecast parts could eliminate a great deal of fabrication in labor costs in a steel door, K-F next investigated car doors. Because of the necessity of a special bonderizing treatment, K-F now plans to place a steel skin, hemmed into an envelope over the diecast aluminum frame. The first door frames utilizing aluminum sand castings have proved practical and satisfactory for automotive use after extensive tests. Because they are more adaptable to diecasting, rear doors are being developed first. Weights of the rear door in steel is 68 lb; in aluminum about 53 lb, or a total savings per car of 30 lb for rear doors only. In addition to weight savings K-F expects to have fewer door parts, better interchangeability, better door fit, quicker fitting of hardware and accessories and better weather sealing.

If the use of diecast frame doors progresses as expected, Kaiser-Frazer will next make dies for the casting of instrument panels and will also try the application of a diecast frame plus steel skin to the manufacture of the decklid. K-F states that the successful use of this technique would permit the manufacture of instrument panels in shapes and contours having re-entrant angles and styling features not now practical by the use of steel stamping. Anticipated benefits include: Fabrication of the instrument panel in its final form, more accurate location of openings and easier assembly of the instruments to the panel.

Bedford disclosed that Doehler-Jarvis, working with K-F on the development of diecast products, has developed a high pressure, cold chamber diecasting machine for making doors which is 48 x 48 in., has a closing pressure of 424 tons, and operates at a rate of 50 strokes per hr for an anticipated average yield of 30 pieces per hr. Four presses will be required for the production of rear doors at the rate of 500 per day.

o o o

DIESEL DESIGN: *A West Coast firm is starting production on what is claimed to be the world's lightest diesel engine (607 lb). The engine is 37 in. long, 20¾ in. high, and produces 15 hp. A decompression release eases hand cranking of the engine, which was designed for use where power is not available.*

o o o

THERE are two primary obstacles standing in the way of improved manufacturing operation, according to Bedford. Initial cost of the new machine is the first hurdle. The second obstacle is the loss that is taken on tools and equipment which are to be replaced. In Bedford's opinion, it is the latter factor "which too often determines whether the new methods, regardless of their efficiency, are to be adopted at all."

The K-F executive blamed traditional depreciation rates as a serious hindrance to replacement of obsolete manufacturing facilities. He advocated a change in depreciation and amortization regulations which will permit industry to write off on a short-term basis the investment which it requires to expand facilities to create new productive power. Bedford argued that a sensible depreciation and amortization law would absolve industry forever from the charges that certain groups are spitefully holding back new developments in materials and products to the detriment of the buying public. He also suggested that such a change in our national laws would eliminate worldwide shortages attributable to underpowered productive facilities. Finally, he said, a change in existing regulations would enable industry to deliver its products to the consumer in greater quantities and at lower costs.

Republic Steel Dividend

Cleveland

• • • At a meeting of the board of directors of Republic Steel Corp., Feb. 17, a regular dividend of $1.50 per share on the 6 pct cumulative convertible prior preference stock, Series A, was declared payable Apr. 1, 1948, to stockholders of record Mar. 10, 1948, and regular dividend of 25¢ per share on the common stock of the corporation was declared, payable Apr. 2, 1948, to stockholders of record Mar. 10, 1948.

The board also declared an extra dividend of 50¢ per share on the common stock, likewise payable Apr. 2, 1948, to stockholders of record Mar. 10, 1948.

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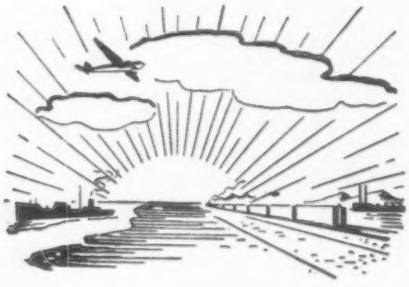
West Coast . . .

ROBERT T. REINHARDT

• Oregon mining interests wage fight to open railroad lands to mineral development . . . WAA machine tool sales fail to glut Los Angeles market.



PORTLAND, ORE.—If mining interests of Oregon are successful in their fight now being carried to Congress to open up Oregon and California Land Grant areas for mining, the days of '49 may be repeated.

According to A. O. Bartell, manager of the Raw Materials Survey of Oregon, the principal obstacle to the growth of the mineral and mining industry in western Oregon is the present policy of the Department of Interior which prevents the exploitation of the Oregon and California railroad lands, and the Coos Wagon Road lands.

These lands, once granted to railroads serving that area and later returned to the public domain, are said to represent approximately 2½ million acres in western Oregon, or roughly one-third of all the land west of the Cascade Range in Oregon. It is reported that more than 50 pct of the mineral bearing or mineralized areas of Jefferson, Jackson, Coos, Curry and Douglas counties in southwestern Oregon are included in this territory. Every odd section with the exception of a few in southwestern Oregon belongs in the California and Oregon Land Grant area.

As the situation now stands a prospector who has successfully located a mineral deposit must go to the expense of a survey to determine if he is staking a claim on these lands and if such is the case he is prohibited from developing the mine. Apparently this situation stems from a decision handed down in 1937 where it was stipulated that such areas should first be developed for their timber resources, and that mining should be relegated to second place.

THE Oregon Mining Assn., Oregon Chapter of the American Institute of Mining and Metallurgical Engineers, Oregon State Dept. of Geology and Mineral Industries, and the Raw Materials Survey have succeeded in having Senator Guy Cordon and Representative Harris Ellsworth file companion bills in the 80th Congress to open these lands for mineral entry.

Mr. Bartell, manager of the Raw Materials Survey, with the assistance of mining interests and state geologists, has rounded up a list of mineral deposits which are at the present time blocked off from further development. Among these minerals are the following:

Chromite: There are known deposits of this mineral on O and C lands in the Illinois River area, Grayback area, and in the Greenback area east of the town of Wolf Creek. It is interesting to note that there are reliable reports which indicate that a good part of the tonnage of chromite produced in that area and sold to the Metal Reserve Board during the war was "bootlegged" from deposits that were on O and C land.

Refractory Clay: A unique deposit of high alumina clay suitable for the manufacture of refractory bricks for furnace linings and other high temperature uses occurs on Hobart Butte near Cottage Grove in Lane County. It is thought that this deposit contains one of the few strata of clay on the entire Pacific Coast from which super-high-duty refractories can be made.

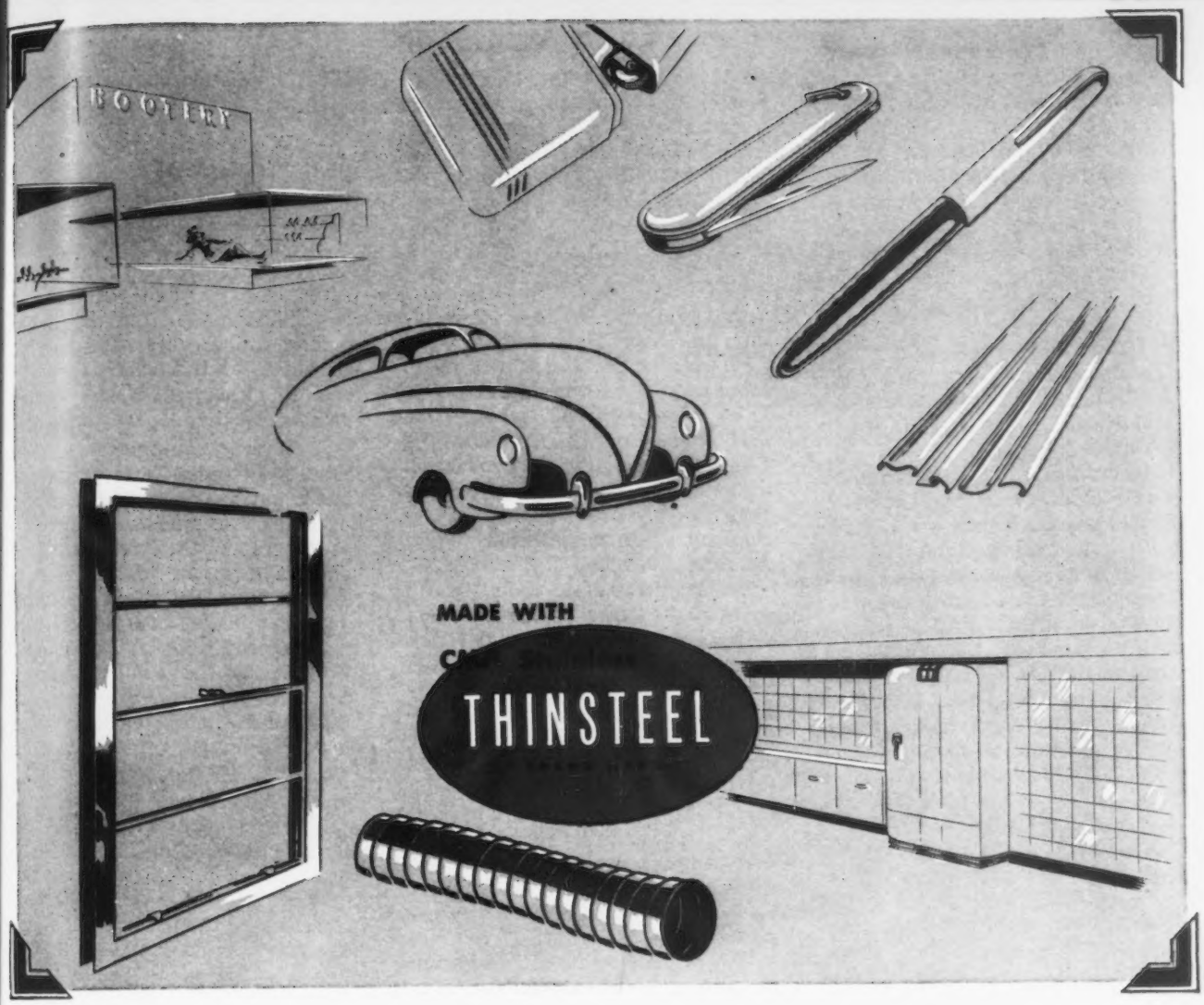
One claim in this area which was staked out before the 1937 deadline is in production and results in a virtual monopoly on the clays of Hobart Butte.

Bauxite: Large deposits of bauxite containing a high percentage of iron have been discovered in the restricted areas. This ore is similar to that which Alcoa has been experimenting with for the production of alumina and which gives promise of a local source of this material. Bauxite deposits of considerable size have been found in Washington County and elsewhere.

Bentonite: Good grade samples have been brought out of an area northeast of Ashland, but not too much is known of the commercial possibilities of this deposit. Industrial uses for bentonite have been rapidly expanding because of its ability to form a seal in wells, dams and other constructions and its use as an emulsifier.

Gold, Silver, Lead, Zinc and Copper: In the Bohemia mining district which has been worked since 1875 and has yielded in excess of $9 million worth of gold, silver, lead, and zinc, some of the most promising areas have been eliminated as producers because they were in-operative at the time the Dept. of Interior made their ruling against mining on O and C lands. There are known mineral prospects in the Silver Peak mining districts, townships 31 and 32 which are closed to development because of present restrictions and the major producer in the area is now prevented from further development on one side because its mineralized zone enters O and C land. Another mine in which further development is restricted is the Benton. Good specimens of copper have been found in the Illinois River area west of Grant's Pass and in the vicinity of Steamboat on the Oregon-California line. These areas are also closed.

Nickel: O and C checker-boarding covers half of the serpentine peridotite formation that carries nickel ore, and exploration and development is prevented in several sections where deposits are anticipated. U. S. Bureau of Mines at



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Salt Lake City has worked out the metallurgical problems in recovery of a ferronickel from the ores found in Oregon, and the Albany, Oregon laboratory is now constructing a pilot plant to determine the economics of the process to be used.

Other minerals which are known to exist on restricted lands include, barite, granite, limestone and talc.

LOS ANGELES — The much feared impact on the machine tool industry of War Assets Administration sales has failed to materialize here.

According to L. Z. McKean, regional chief, Machine Tools and Machinery Division, WAA, "The expanding metalworking industry in this region absorbs large quantities of good used machinery and more is required. WAA sales have been at the rate of a million dollars a month for the last 15 months. In spite of these sales, increased metal working activities in this area will create a market for an additional $10 million worth of standard general purpose machine tools."

Machine tool sales in this area continue brisk. Engines lathes remain in first place as the prime demand item. Mills, shapers, planers, single spindle drills, turret lathes, surface grinders, and such general purpose machine tool equipment are in demand, Mr. McKean told THE IRON AGE.

Manufacturers today call for higher spindle speeds and top production machine output, with replacement of old tools continuing. Scrap prices are at an attractive figure, making the unloading of obsolete machinery less expensive than it may be at a later date, Mr. McKean pointed out.

"No slackening of machine tool sales shadows the near future. The opening of General Motor's plant in Van Nuys presages a multitude of small shop suppliers, while generous placing of parts orders by the Ford Motor Co. is alerting southern California machine shops to housecleaning and equipment buying," Mr. McKean concluded.

The General Motors plant referred to by Mr. McKean is scheduled to start operations the latter part of this month with dedication ceremonies held last week. Present schedule calls for the production of 35 Chevrolet passenger cars and 15 trucks per hour on a one shift basis. The assembly line here is similar to that used at the Flint, Mich., plant where car frames are carried on an overhead conveyer considerably higher than in the standard assembly lines. This suspended type line is said to facilitate the work and to be more convenient for workers.

ANOTHER motor car will start running off the assembly lines at Van Nuys this month. Davis Motor Car Corp., will begin production of a 3-wheel, practically-all-aluminum, coupe which was first announced in THE IRON AGE (Aug. 7, 1947, p. 98). Production lines to produce approximately 50 cars per day are nearing completion in what was formerly Tim Aircraft Co. plant at Van Nuys.

The manufacturers claim that all parts of the car, with the exception of the Hercules 60 hp engine which is produced at Canton, Ohio, and the windshield manufactured by Libby Owens Glass Co., are produced in the West. The all-aluminum body is fabricated of sheets being supplied by Permanante Metal Corp. from its Spokane, Wash., rolling mill. Engineers of this company worked closely with those of the Davis Motor Car Corp. in developing fabrication and assembling methods.

The car is scheduled now to sell for approximately $995 f.o.b. Van Nuys.

NORTH American Aviation Inc. has leased a portion of the aircraft manufacturing facilities at Vultee Field, Downey, Calif., for light manufacturing operations, aircraft modifications, and storage. The company is leasing 600,000 sq ft of floor space, about two thirds of the facilities formerly utilized by the Consolidated-Vultee Aircraft Corps.

This company will also move its AT-6 Texan Trainer modification line from its Los Angeles plant to Downey and the construction of detailed aircraft mock-up assembly for the Air Force Mobile Training Unit will be located there.

At this time it is not known whether Harlan J. Bradt, mining engineer, will carry his suit against the Edward T. Foley interests to a higher court.

Mr. Bradt's suit, designed to set aside the sale of Iron Mountain ore properties to the Henry J. Kaiser interests, was lost when the superior court judge gave approval to the sale. Mr. Bradt had sought $3,941,250 as his one fourth interest in the transaction.

SALT LAKE CITY—A strike of coal-miners at the Big Horse Canyon mine, owned and operated by the Geneva Steel Co., was narrowly averted early this month when John L. Lewis threatened such action unless oil furnaces were replaced by coal furnaces in the 604 homes at Dragerton, the town recently purchased from the government by the Geneva company.

Oil burning equipment had been installed in these homes after the steel company had set up a model house to determine the desires of the miners and their families. This home was equipped with an electric refrigerator, electric range, electric water heater and the oil furnace. According to J. W. Galbreath, who manages the town, every resident voted for the utilities as installed in the model and all homes were accordingly equipped.

However, Mr. Lewis charged that the use of oil instead of coal violated the company's contract and only relented on the strike threat when it was agreed between the company and the union that coal furnaces would replace the oil burners upon individual request of the tenants.

One of the largest construction projects in this area is scheduled to start March 1st, when Standard Oil Co. of California, breaks ground for its new refinery in north Salt Lake City.

* * *

REFUSAL of the U. S. Supreme Court to review four metal mine subsidy tax cases will permit the state of Utah to retain and continue collecting net proceeds taxes on government premium payments, it has been reported. However, the industry still hopes that premium payments will be eliminated from the mine occupation tax. This assessment is based on one times the gross while the net proceeds tax is figured on two times the net proceeds. The regular state and local property levies are applied against the two bases. The wording of the two statutes differs so that the supreme court action with respect to the net proceeds tax does not necessarily apply to the occupation tax. About 75 cases involving this latter assessment are pending in the courts.

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Washington . . . EUGENE J. HARDY

• FTC steel case analyzed . . . Hearing to end by summer . . . Price-fixing main charge . . . Benefits to consumers cited by FTC attorney

WASHINGTON — The hearings on the Federal Trade Commission's price-fixing charges against the steel industry thus far have produced little which could be used to analyze the commission's position, being devoted almost entirely to legal sparring between government and industry counsel.

The net result has been the publication of information purporting to analyze the future direction the case will take. One of these published reports maintains that the commission is already off schedule and will not be able to wind up the hearings by June 1. Another assumes that the commission's charge that industry pricing policies have prevented more rapid industrialization of the Western states will require thousands of miles of travel and delay the proceedings considerably.

In an exclusive interview with THE IRON AGE, Lynn C. Paulson, the commission's chief attorney in the case, labeled these reports "unwarranted assumptions" not borne out by the facts.

On the first point, Mr. Paulson stated that he is still adhering to his original schedule and that he expects to wind up the hearings by "the end of May," both in Washington and in the field.

Despite some doubts over the speed with which the industry could assemble complete price data for the period from the death of the NRA in 1935 through the first half of 1947, Mr. Paulson told THE IRON AGE that half the steel companies will have submitted this material by the end of this week. The remaining companies are committed to having this data in the commission's hands by Mar. 1, with one exception which will file by Mar. 10.

Mr. Paulson further stated that the hearings will remain in Washington until all the price data has been submitted, the time being filled with introduction of material pertaining to alleged identical bids on government contracts.

THE price lists already submitted, according to Mr. Paulson show definite identical features, including dates and printing format as well as the actual prices. He points out that if the extra lists show the same similarity, comparison will be a relatively simple matter.

The FTC attorney expects to leave Washington sometime next month and begin field hearings. He hopes to limit these hearings to the cities of New York, Pittsburgh, and Chicago, and labels as pure "bunk" statements that thousands of miles of travel will be necessary to prove the effect of the industry's pricing methods on the industrialization of the West. It is his belief that if he is able to prove his main charges this latter point will be shown to be a natural effect without much difficulty.

While on the road, Mr. Paulson will attempt to show how the individual companies utilize the freight rate compilations of the American Iron & Steel Institute, and also determine whether companies are following basing point practices.

PERHAPS even more important is the effect the case will have on steel consumers, assuming that Mr. Paulson's radiant confidence results in a victory for the commission. Mr. Paulson, citing the abolition of Pittsburgh plus, states that the current case will also have a healthy effect on steel consumers. He expects the case to result in more independent action on the part of steel producers, more competition, and, as direct result of this competition, lower prices.

The commission's main complaint is directed toward the alleged refusal on the part of the steel industry to sell f.o.b. mill and the alleged cooperative method of announcing prices.

Since there must be proof of concert of action as well as a finding of identical prices, Mr. Paulson expects to direct his primary attack against the freight rate compilations of the American Iron & Steel Institute and the distribution of such information. It is his belief that freight rate books are, in effect, price books. Admitting that this may be difficult to prove, he feels that the courts will hold this to be illegal and cites past cases to prove his point.

THE end result, that is, before the court battle begins, according to Mr. Paulson, will be a cease-and-desist order calling on the steel industry to (1) sell f.o.b. mill when requested, (2) conform to the decision in the Corn Products and Staley basing point cases which would have the effect of establishing individual plant prices for all steel products, or, in other words, a basing point at each producing point, and (3) cease the compilation of freight rate information. Other points probably would be covered in the order, but these are considered the crux of the problem.

Mr. Paulson points out that an immediate effect of such an order would be to benefit steel consumers now being cut off from steel sup-

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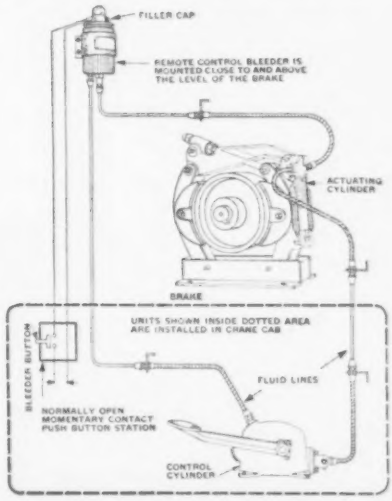
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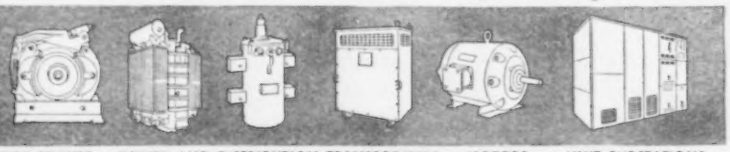

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plies due to the reluctance of steel producers to absorb increased freight. It is claimed that these consumers would be able to buy steel under an f.o.b. mill pricing system, provided they were willing to pay the freight. The FTC attorney is not against freight absorption as such, but is attacking the effect of the alleged cooperative pricing action on such freight absorption.

As to the effect of the Supreme Court's decision in the pending case against the cement industry, Mr. Paulson flatly told THE IRON AGE that, in his view, the decision "will not make any difference" since the case against the steel industry is more similar to the milk can case, a price-fixing charge.

FTC lost the cement case, involving basing points, in the lower court, and won the milk can case, primarily a price-fixing charge, in the same court.

THEREFORE, this statement indicates that FTC will not try to wipe out the basing point system at this time, but might be willing to compromise. For example, it is possible that the commission will not insist on a basing point at every producing point, but will agree to an extension of the system, such as the establishment of additional points west of Chicago.

Commenting further on the cement case, Mr. Paulson emphasized that "an adverse decision won't stay the hearings and a favorable decision might result in some concession on the part of the steel producers."

Summing up, there are three points which seem most important at this time: (1) The speed with which FTC expects to move the case, (2) the emphasis on price-fixing, and (3) Mr. Paulson's confidence.

Snyder Says Lower Taxes Not in Cards Within Near Future

Chicago

• • • **John W. Snyder,** secretary of the treasury, declared at a luncheon meeting of the Chicago World Trade Conference held in the Hotel Sherman on Feb. 16 that "the cold facts of the present situation preclude reductions in federal taxes at this time." A realistic appraisal of tax problems must be based on the long run national interest, the secretary said. Present economic conditions, budgetary considerations, inflationary pressures and debt management problems are such that we cannot deliberately allow revenues to drop below present levels at this time, Mr. Snyder told the assembly.

According to the Secretary, 79 pct of the proposed budget for the fiscal year ending June 30, 1949, is war related, including $7 billion or 18 pct of the total for proposed international commitments. The estimated budget surplus for the period is $4,800,000,000 as compared with an estimate of $7,500,000,000 for the fiscal year ending June 30, 1948.

Concerning future business trends, Mr. Snyder said that the huge deficit of consumer and capital goods here and abroad make it difficult to foresee any important decline in American business for some time ahead. "The needs for industrial replacement and expansion, our road building programs, our municipal construction, and the urgent requirements for housing are a measure of the pent-up demand, and add to this an appraisal of the rehabilitation needs of war devastated countries and the needs of many countries that look to the United States for a substantial part of their imports indicates we must expand our export market and open our own markets to foreign goods if we are to stabilize the world's economic equilibrium."

The Secretary told the Conference that public funds are necessary to meet temporary short term emergency requirements for restoring world trade, but these funds lack the flexibility required in long range development. To stimulate the flow of private capital, he said, it is necessary to have a code of fair investment practices that will enable capital to flow abroad under mutually profitable conditions with adequate safeguards. Government policy at this time is to make no special tax concessions to American citizens and corporations to go into foreign market, but a special study of the problem is being made, according to Mr. Snyder.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

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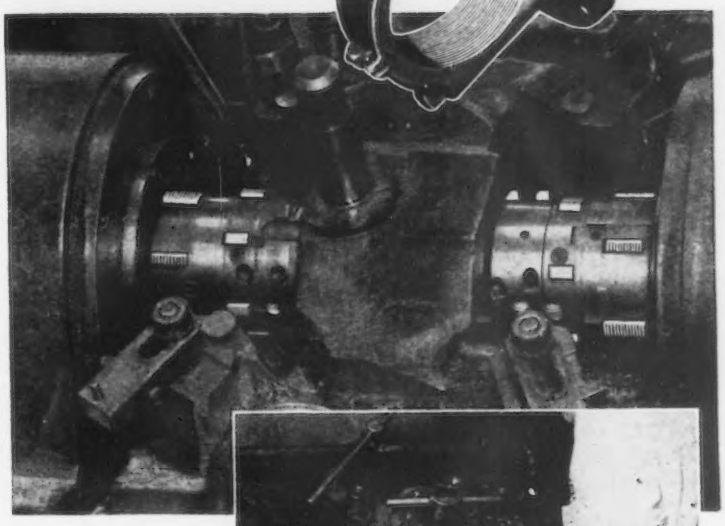

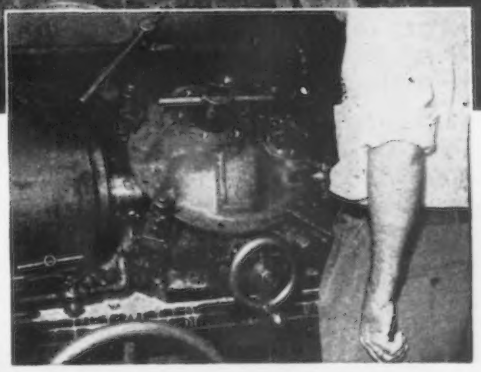

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PERSONALS

W. H. DUPKA, director and member of executive committee, Jones & Laughlin Steel Corp.

• **W. H. Dupka,** vice-president and controller, Jones & Laughlin Steel Corp., Pittsburgh, has been elected a director replacing **E. J. Kulas,** who has resigned. Mr. Dupka has also been elected a member of the executive committee.

• **William J. Redman** has been made division chief engineer of the Wilson-Snyder Mfg. Div., Oil Well Supply Co., Braddock, Pa. He started with Oil Well Supply at the Wilson-Snyder plant in 1923 as a draftsman and was appointed assistant chief engineer in 1942, holding that position until his present appointment.

• **Charles N. Schmidt** has been appointed assistant director of advertising, U. S. Steel Corp. of Delaware, Pittsburgh. Mr. Schmidt comes to the Delaware Corp. from American Steel & Wire Co., where he has been manager of the advertising division.

• **Donald L. Ande** has been appointed district manager of U. S. Steel Supply Co.'s Baltimore warehouse. Mr. Ande joined the company in 1947 as assistant district manager of the Pittsburgh warehouse. Prior to that he was employed in both the sales and production departments of Carnegie-Illinois Steel Corp.

• **Hugh J. Ferry** has been named a director of the Packard Motor Car Co., Detroit. He joined Packard 38 years ago, and has been the company's treasurer since 1926, and a vice-president since 1945.

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• **H. H. Bullen** has been named manager of western district electrical products sales, a newly-created post of the American Steel & Wire Co. He will continue to maintain headquarters in Chicago. Mr. Bullen was transferred to the company's Chicago office in 1929 as salesman from the Salt Lake City office, and 3 years later was named assistant manager of electrical, wire rope and construction materials sales.

• **J. R. Kelley** has been appointed eastern sales representative, Ohio Valley Steel Sales Co. Mr. Kelley will represent the company in the New England states, New Jersey and eastern New York. His headquarters will be located at Jersey City, N. J.

• **Joseph R. Lex** has been named assistant general manager of Progressive Welder Co., Detroit. Mr. Lex joined Progressive early in 1946.

• **E. E. Smith** has been named manager of sales for the southwestern area, with offices at Dallas, National Tube Co., Pittsburgh. He will have general supervision of sales in the company's Dallas, Denver, Houston, New Orleans, and Tulsa district offices. **James R. Boax** succeeds Mr. Smith as manager of sales at Houston. Mr. Smith spent several years in the engineering and operating departments of the company's National Works at McKeesport, Pa., before going to Texas as a field engineer in 1929. He served as director of service for National Tube's sales department, was made manager of sales at Tulsa in 1943, and went to Houston in the same capacity last year. Mr. Boax has had 17 years experience with National Tube and Oil Well Supply Co., also a U. S. Steel subsidiary. After 4 years with the operating department at National Works, he became a field service engineer in 1934. He has subsequently been a salesman for National Tube in Tulsa, district manager of tubular sales for Oil Well Supply Co., assistant priorities administrator of National Tube during the war, and recently a salesman in the Houston office.

CHARLES L. HUSTON, JR., vice-president, Lukens Steel Co.

• **Charles L. Huston, Jr.,** has been elected vice-president and **Robert G. Bloom** has been elected controller, heretofore an appointive office, of Lukens Steel Co., Coatesville, Pa. Mr. Huston had been executive assistant to the president which position he will continue to hold. He has been associated with Lukens and its divisions since 1939 when he joined the organization as director of personnel relations. Previously he was associated with American Rolling Mill Co. for 10 years. Mr. Bloom has served as controller of Lukens Steel since 1943. Starting with the company in 1927, he was successively chief clerk, assistant controller and auditor.

• **Frank E. Coho** has been appointed coordinator of employee relations, Blaw-Knox Co., Pittsburgh. Mr. Coho came to Blaw-Knox from Dravo Corp., where he had been employed since 1942. His most recent position was that of labor counsel. He succeeds **Walter Werner,** who has resigned.

• **Donald T. Aikenhead** has been elected treasurer of Bethlehem Steel Corp., New York, succeeding **W. J. Brown,** retired. Mr. Aikenhead, formerly assistant treasurer of the corporation, completed 25 years of service with Bethlehem. He was appointed assistant treasurer in 1931. **Donald W. Baird,** formerly manager of foreign credits and collection, has been elected assistant treasurer.

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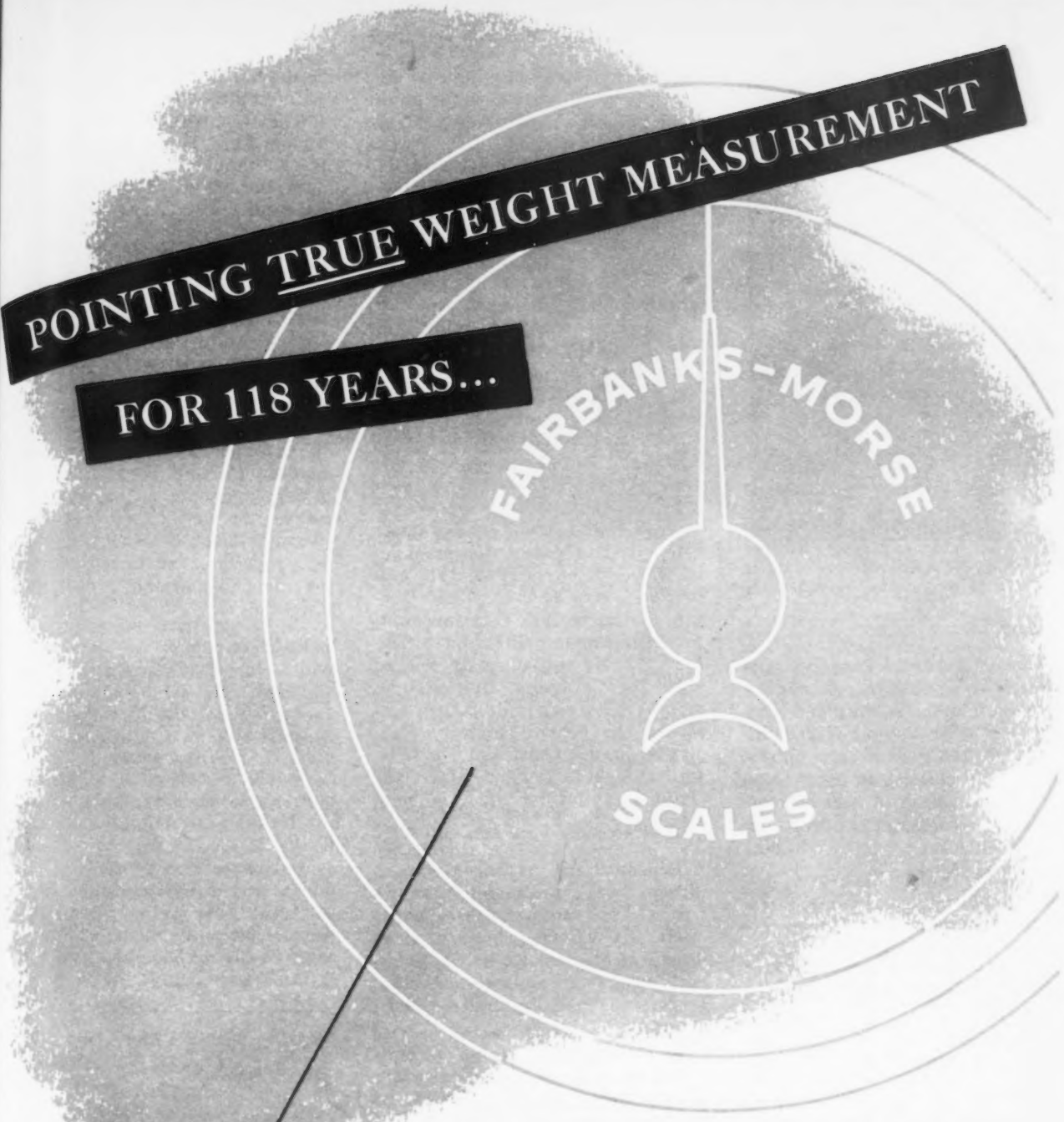

To men whose production . . . whose payment . . . whose purchases are measured by weight, the name "Fairbanks-Morse" is a guarantee of unfailing accuracy.

Modern Fairbanks-Morse Scales have added the advantages of automatic weighing and push-button recording to almost every conceivable weighing operation — including, no doubt, some similar to yours.

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HARRY L. ADAMS, vice-president in charge of operations, Weatherhead Co.

• **Harry L. Adams** has been appointed vice-president in charge of operations, Weatherhead Co., Cleveland. Mr. Adams joined the Weatherhead Co. in 1933 as an engineering specialist on screw machine operations, and later became assistant to the president on manufacturing.

• **Allen R. Kelso** has been appointed executive vice-president and general manager of the Warco Press and Warren Stamping Divs. of Federal Machine & Welder Co., Warren, Ohio. **Walter Dinse** has been appointed vice-president and general manager of the welder division, and **Henry A. Stix,** treasurer and comptroller.

• **Russell Franks** has been named chief metallurgist of the technical service and development department of Electro Metallurgical Co., unit of Union Carbide & Carbon Corp., New York. Mr. Franks' headquarters will be in Pittsburgh. The following men have been named division managers of service: **J. N. Ludwig, Jr.,** with headquarters in the Pittsburgh office; **R. J. Portman,** Chicago; and **F. W. Hanson,** New York. **W. B. McFerrin** has been appointed district manager of service with headquarters in Detroit.

• **Dr. A. B. Kinzel** has been elected president of Union Carbide & Carbon Research Laboratories, Inc., New York.

• **Rodney Chase** has been elected vice-president in charge of public and industrial relations of Chase Brass & Copper Co., Inc., Waterbury, Conn. Previously he had been director of those activities. He began his employment at Chase in 1920.

• **John Doerfner, Jr.** has been appointed plant manager, and **Carl H. Beverly,** resident comptroller of General Motors Corp.'s gray iron foundry being built at Defiance, Ohio. Mr. Doerfner worked at the Saginaw malleable iron plant of the central foundry division until 1938 and was later associated with Erie Malleable, Bendix Products, Eastern Aircraft Div. of General Motors, and Gunite Foundries Corp. He was production manager of the division prior to this promotion. Mr. Beverly joined General Motors in 1927 in the accounting department at the Pontiac Motor Div. He subsequently worked with the Chevrolet, Buick, Oldsmobile and Pontiac divisions, and joined the central foundry division at the Lockport plant in 1946. He has been in Defiance since last October following up his new duties.

• **Benson Ford** has been named director of the Lincoln-Mercury Div. of Ford Motor Co., Dearborn, Mich. He was also elected a vice-president of Ford Motor Co. Since last October he has been actively associated with the Lincoln-Mercury Div.

• **Lee Hickox** has joined the staff of Container Laboratories, Inc., Chicago. Prior to the war, Mr. Hickox spent more than 10 years with the Container Corp. of America in various capacities in carton, container, and sales research divisions. He has recently been in charge of a special development program with the Standard Cap & Seal Corp.

• **John F. Wilson,** works manager of the Cheektowaga, N. Y. plant of the American Machine & Foundry Co., has been appointed executive assistant to Samuel S. Auchincloss, vice-president in charge of the plant's operations. **J. Leslie Lenton,** plant superintendent, succeeds Mr. Wilson, and **William F. Patterson,** assistant superintendent, becomes superintendent.

• **Roland E. Harris** has been appointed director of the central follow-up department, purchasing division, Ford Motor Co., Dearborn, Mich. Mr. Harris was formerly superintendent of planning and scheduling for Chrysler Corp.

• **Graeme K. Howard,** formerly vice-president in charge of overseas operations at General Motors Corp., has been named a consultant to survey the Ford Motor Co.'s International Div. He will leave soon to visit Ford operations in Europe. Mr. Howard joined GM overseas in 1920 and was stationed in Bombay and Copenhagen, returning to New York in 1931 as general manager of export operations. He was named vice-president of General Motors in 1939 and was later advanced to vice-president in charge of overseas operations.

• **Ralph N. Isham** has been elected a director of A. M. Castle & Co., Chicago. Mr. Isham is also a director and vice-president of Streeter-Amet Co., Chicago.

• **Frank W. Seivert** has been appointed advertising manager for the Kellogg Div. of the American Brake Shoe Co. Mr. Seivert has served in various production and purchasing capacities since joining Brake Shoe in 1941. In his new position he will continue to be located at the division headquarters in Rochester, N. Y.

FRANK W. SEIVERT, advertising manager, Kellogg Div., American Brake Shoe Co.

• **Jack K. Bybee** has been appointed district manager of the Detroit sales territory of Ampco Metal, Inc., Milwaukee. He will be assisted by **Don Coleman,** field engineer. **Gordon E. Brown** has been appointed district manager of the Chicago sales territory, being assisted by **Robert H. Louthain,** field engineer. **Tom Coghill,** who has been field engineer in the Chicago territory, has been appointed development engineer-process industries with headquarters in the Chicago office of Ampco.

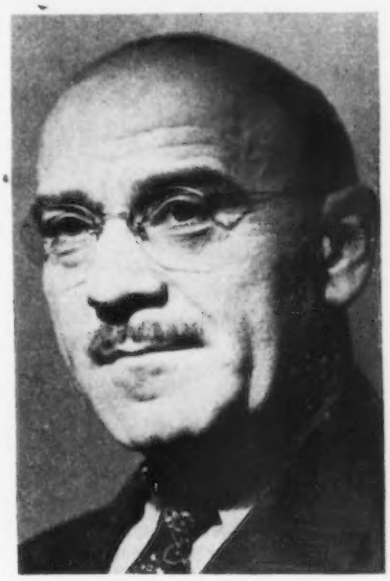
• **Robert M. Norton,** who has been the New York State manager of the Hanson-Van Winkle-Munning Co., with headquarters in Skaneateles, has been transferred to the company headquarters in Matawan, N. J.

• **Buel Starr** has been appointed manufacturing manager of Pontiac Motor Div., General Motors Corp., Pontiac, Mich.

• **J. L. McDermott** has been appointed western sales manager of the Glyco-Ryertex Div. of Joseph T. Ryerson & Son, Inc., Chicago. Mr. McDermott became associated with the Ryerson Co. in 1923.

• **Edward B. Nitchie** has been appointed manager of operations and engineering, Basic Refractories, Inc., Cleveland. Mr. Nitchie was formerly associated with Cutter Laboratories, Berkeley, Calif., as works manager.

• **Robert M. Simpson** has been appointed district sales manager for the Columbia Chemical Div. of Pittsburgh Plate Glass Co. with headquarters in Chicago. He has been associated with the Columbia Chemical Div.'s sales organization since 1944. **Brooks M. Dyer** has been named assistant district sales manager at St. Louis. Mr. Dyer has been associated with the Columbia Chemical Div. as a sales representative in the Philadelphia district during the past 5 years. C. C. **Thompson,** credit manager for Columbia will continue in that capacity and also assume the responsibility of office manager at the division's headquarters in Pittsburgh. **Paul R. McHail,** associated with the firm since 1946, has been appointed manager, order and service department, with headquarters in Pittsburgh.



F. C. RITNER, vice-president in charge of personnel, Carboloy Co., Inc.

• **F. C. Ritner,** formerly personnel director of Carboloy Co., Inc., Detroit, has been promoted to vice-president in charge of personnel. He joined Carboloy in 1929 as a sales and service engineer. In 1936 he became assistant to the president, and was appointed personnel director in 1941.

• **William F. Mitchell,** superintendent of Pennsylvania Salt Mfg. Co.'s Wyandotte, Mich., plant for the past 3 years, has been appointed assistant vice-president. He joined the firm in 1936. **Gustave A. Nelson,** formerly assistant superintendent at Wyandotte, has succeeded Mr. Mitchell as superintendent. Mr. Nelson has been with Pennsalt since 1928 and was technical foreman before becoming assistant superintendent. **Herman J. Eichengofer** and **Hugh C. Land** have been made assistant superintendents of the Wyandotte plant. Mr. Eichengofer, with the company since 1932, was production supervisor at the time of his new appointment. Mr. Land came to Pennsalt in 1946 as a maintenance and construction engineer.

• **Joseph C. Herbert,** manager of the B. F. Goodrich Co.'s newest tire and tube manufacturing plant in Tuscaloosa, Ala., has been named assistant managing director of Industria Colombiana de Llantas, Bogota, Colombia, a B. F. Goodrich associated company.

• **G. T. Kennedy** has been named manager, Machinery Forging Co., Cleveland. He was formerly associated with Lake City Malleable Co. and later, owner of the G. T. Kennedy Co., Inc.

• **Arthur C. Link** has been appointed manager of organization planning of Western Electric Co., Inc., New York. He joined the Hawthorne works of Western Electric in 1911 and became comptroller of the works in 1945.

• **Joseph F. Eckel** has been promoted to manager of the General Electric Co.'s Lynn River Works, Mass. Assistant manager of the River Works since 1945, he succeeds **George M. Stevens,** who has retired after 46 years of service.

• **F. D. Weatherholt** has become assistant industrial sales manager, Westinghouse Electric Corp., with headquarters at East Pittsburgh. Mr. Weatherholt came to Westinghouse in 1921. In 1925 he was transferred from East Springfield, Mass., to the Albany sales office and a year later was assigned to the New York City office. In 1940 he was named eastern resale manager, the position he held at the time of his new appointment.

OBITUARY...

• **W. R. J. Dunn,** president of Dunn Construction Co., Birmingham, died Feb. 13. He had headed the construction company since 1927.

• **Robert L. Duncan,** 45, president and sales manager of the Midland Co., South Milwaukee, Wis., died Feb. 6.

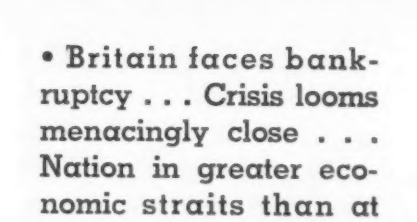
• **Archie W. Land,** 63, general yardmaster at the Buffalo plant of the Republic Steel Corp., died Feb. 10.

• **Thomas A. Reynolds,** who had been superintendent of McConway & Torley Corp., Pittsburgh, for about 30 years, died Feb. 4.

• **P. J. Flaherty,** chairman of the board, Johnson Bronze Co., New Castle, Pa., died Feb. 12.

European Letter . . .

• Britain faces bankruptcy . . . Crisis looms menacingly close . . . Nation in greater economic straits than at any time since Napoleonic wars . . . Only hope lies in American aid.



LONDON—Britain faces bankruptcy. That is the real significance of the government's latest White Paper. At last, the British people now know where they stand. In the past 2 years, they have as a community overspent their income to the extent of $4000 million and the rate of overspending was almost twice as large in 1947 as in the preceding year.

At the present rate of expenditure (which has fallen since its peak last August but now shows signs of settling down at a monthly figure of some $160 million), the remaining reserves of about $2400 million in gold, dollars and unexhausted credits may last Britain and the sterling area until midsummer. After that, it will just be impossible to buy either the food or the raw materials which are necessary for Britain to eat and work. The specter of starvation and mass unemployment is now alarmingly close.

To translate the tables and figures of the White Paper into more homely terms, Britain has been living like an improvident family which, failing to make both ends meet, first spends the accumulated capital of the past, then borrows from friends — from American friends, from Canadian friends, from South African friends—and when their loans are exhausted, begins to pawn the furniture. How else can one describe the latest deal with Argentina in which the whole capital asset represented by the British-owned railways is bartered away for 18 months' supply of meat?

It is of course true that there is nothing discreditable in the events which led the British community to this desperate plight. Alone of the belligerents (except the German aggressors) Britain fought in two world wars from the first day to the last. The income from overseas investments which nearly bridged the gap between imports and exports in 1938 disappeared in the struggle. Exceptional conditions of world demand created by war devastation added $1200 million to the cost of British imports in 1947. But in fact the reasons which have brought the British to beggary are less likely to be remembered than the fact that they are beggars. The old soldier showing his campaign medals at the street corner is an object of pity, not of respect.

WHEN a family faces bankruptcy, either it goes under to a life of perpetual makeshift and pauperism, or it restores its solvency by vigorous action—by buying less, by cutting down every kind of expense and by straining every nerve to sell more of its goods and services. A nation is in no different case and the choice open to the British people is in reality precisely the same difficult choice between pauperism and gruelling recovery. The only question worth asking today when the crisis is, in Sir Stafford Cripps' words, not a matter of years, but of months and weeks, is what further steps the British people can take to consume less and produce more, to reduce their standard of living and at the same time do harder work.

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Both wages and profits have to contribute their share. Bankruptcy is a family responsibility and no section of the community can avoid its hardships. The real need for workers and managers alike is longer hours and more output for the same income. In this way, more goods could be produced for export without new financial pressure being created to divert those goods to consumption at home. So drastic a departure from current industrial practice is too much to hope for, but at least the principle of no further wage increases save for cases where workers are genuinely below an adequate level of subsistence must be endorsed.

Further, there is certainly a case for increasing the contribution to national solvency by those who, despite their reduced standards, can still afford it best. Heavier taxation or limitation of dividends and the control of expense accounts will help politically, and to some extent economically. Even if such steps must wait upon the budget, their announcement would go far to relate the question of wages to the wider action needed to counter bankruptcy abroad and inflation at home.

BUT, although it will be necessary to temper the cuts by considerations of social justice, the brute fact remains that standards of consumption in Britain do not reflect the insolvency which may lie only a few months ahead. Can it be said that the rationing of domestic fuel has been drastic enough in view of the vital importance of coal as an export? Can Britain afford $800 million for government expenditure overseas, or to feed a million mouths in the Forces in return for no productive work? It is easy to make a case for keeping 2 million government servants, but if 500,000 were returned to industry, would

the gain in output not ease the burden of the controls? By what yardstick can the overseas expenditure of $200 million on "tourism" in 1947 be justified? It is no longer a question of choosing whether or not to maintain certain amenities. The stark fact is that the means to provide them no longer exist.

In spite of the recent cuts in capital expenditure, it is clear that more has to be done. No one will criticize the government for wishing to build better schools, new hospitals and more and better equipped houses. But this program has added to Britain's insolvency by diverting materials and manpower from the export industries; in that sense it is Americans, Canadians and South Africans who have been paying for part of the British program of development at home. No one denies the desirability of these things, but it is not usual to add a bathroom to the house just as the receivers walk in.

The last items to be cut back should obviously be productive assets, the renewal and modernization of plant. The reductions already announced in these items are severe—probably too severe—but in another field the figures suggest that outlay has been too heavy. The sum of $720 million for new assets overseas, a large part of which must be represented by various schemes of Colonial development, seems unduly high in relation to the time which must elapse before they begin to yield their fruits.

THESE are a few instances picked from a possible list of further cuts and reductions, but simply to set them down shows how painful *their* execution would be and what appalling stresses it would introduce into the national life. But bankruptcy is necessarily an ugly, painful and distressing business. It tests the temper of the most united family. It requires not only fortitude and patience but considerable humility to weather it with dignity and success. Yet bankruptcy is nevertheless the crisis through which this nation may be about to pass. What are its chances of surviving this latest test—a test with none of the glory and solidarity of a nation at war but perhaps more gruelling as a result?

It cannot be said that the outlook is encouraging. In the first place, the country so far has remained in ignorance of the facts. The government's powers of explanation have never been high, but its inability to convey to the public the significance of the gathering economic crisis is beyond all previous failures. And this is not simply a question of poor public relations. The failure goes deeper. It is not only that the government has not talked as though the crisis were serious. Until quite recently, it has not behaved as though it were. In 1946, before the catastrophic rise in American prices and the fierce winter, there was some excuse for believing that Britain could recapture its export trade, police Europe, rebuild its industries, create new social services, rehouse the people and provide cheap food all at the same time.

But the writing on the wall was there for all to see after January or February, 1947. The fatal flux of gold and dollars had begun. The gap between imports and exports was growing. Home production continued to lag, but the government went on its Micawberish way, waiting for something to turn up. Mr. Dalton was happy with his "balanced" budget, Mr. Morrison declared that no further sacrifices could be demanded of the people. Today, with the gap wide open and no prospects of filling it from British resources, even Sir Stafford Cripps' realism may be too late.

IF the British had been made to realize in 1945 that in many ways the problems of reconstruction facing them were no less urgent than that which faced, say, Poland, they might have set to and worked as the Poles have done; but cradled in illusions, they have advanced in their crisis like somnambulists. It is the illusion either of infinite prosperity or of infinitely squeezable profits that makes it still possible for the trade unions to press for more wages and for fewer hours. It is the illusion of wealth withheld by a spiteful government that has turned large sections of the more well to do against the controls and restrictions which they recognized as necessary during the war.

Yet the reality is of a nation in greater economic straits than at any time since the Napoleonic wars. If the present attitude of the different classes in society cannot be mobilized into something more than the collective and disgruntled selfishness they show today, then the British will be obliged to face their supreme economic crisis without the only assets upon which they could still draw — their political balance, their deep natural unity, their phenomenal staying power.

THIS statement will no doubt be contested. Why speak of "Britain's only assets" when there is every chance that by midsummer the Marshall Plan will have been passed by Congress and assistance will be assured for the next 18 months at the least? Even Sir Stafford Cripps has said that the only hope lies in American assistance, to give Britain the necessary time to bring about the restoration of normal conditions.

But herein lies precisely the danger. Continual borrowing can have the same effect as continual drinking. The borrower's — like the drunkard's—sense of reality tends to fade. Britain has already had the American loan and the Canadian loan and will get the South African loan. All have been necessary but all have helped to mask from government and people alike the country's true economic straits. A standard of living has been maintained, reserves have been eaten up, expenditures undertaken on a scale which is quite out of accord with Britain's real economic position. And *what* guarantee is there that the Marshall Plan may not be used in the same way?

The only proper, the only long sighted, the *only* courageous course would be for Britain to pursue now the policy it would pursue if the Marshall Plan were reduced to a half or a third and to use the surplus thus created to build up reserves, modernize industry, develop economic integration in Western Europe and undertake now the program of hard living and hard working in which, in the long run, salvation alone will lie.

Industrial News Summary...

- **Gray Market in Aluminum Buds**
- **Steel Price Changes Deferred**
- **Scrap Quotations Soften Some**

A GRAY market in aluminum sheets has been sprouting for the past several weeks. Whether it will be nipped in the bud within a short time depends upon speed with which increased rolling capacity is installed. It also depends upon how long power shortages will prevent the full use of aluminum sheet rolling facilities.

Tired of seeing lush profits go to steel gray marketeers, enterprising dealers and brokers, able to lay their hands on aluminum sheets and coils, have opened up shop. They have taken advantage of the tight aluminum sheet supply situation and have charged from 4¢ to 20¢ and more a lb above normal mill or warehouse prices paid for light metal sheets. Tight allocations from the mills and warehouses because of a temporary aluminum sheet shortage has played into the hands of aluminum sheet gray market operators.

SOME increases in steel base prices and extras under consideration by one steel company have been deferred pending the clarification of the widespread hysteria over the increase in semifinished steel products—a group of steel products which are a small percent of total steel shipments and which have been selling at close to the price of scrap for some time .

Whether or not major steel companies will boost their prices on such products as sheet and strip remains to be seen. But nonintegrated steelmakers—those mills which buy their raw materials from large integrated steel producers—either have or will soon advance their prices on cold-rolled strip and some grades of specialty sheets. This action is made necessary due to the increased cost of slabs and billets.

No major steel producer this week had raised its prices on sheets and strip. Consumers of these products will now be paying three different prices: Those charged by major steel firms; higher quotations put into effect or to be effective soon by small nonintegrated makers and gray market prices which are two and one-half to three times the average mill price.

THE failure of some steel companies last week to make public or explain the advance in semifinished steel accounted for this action receiving more attention than it probably deserved. Contrary to information from some sources the semifinished steel price increases were not simultaneous nor were they necessarily similar. At least 2 or 3 days lapsed between the notification sent out to customers by at least three large steel producers. Since the price of semifinished steel has been low compared with the cost of scrap and pig iron, it was obvious that action by the leading producer would be followed by other steel firms. No steel company would be willing to continue a low price on a small-profit item when other firms were charging a higher quotation.

No secret has been made of the fact that several steel price increases have been put into effect since the first of the year. A summary of these includes tinplate, terneplate, blackplate for can manufacture, alloy steel bar extras, nails, wire fencing, railroad car axles and wheels, tie plates, all types of pipe and tubing, all types of semifinished steel. A conservative estimate on the basis of 1947 steel shipments indicates that these increases (which steel companies claim were necessary because of much higher prices for materials they purchased) on an annual basis would amount to more than $170 million to the consumer if 1948 operations are as high as last year's.

STEEL operations this week moved up a half point to 93½ pct of rated capacity. Mills were still faced with coke, pig iron and scrap shortages. Until steel companies are able to step up their pig iron and scrap supplies there is little chance that steel ingot production can be moved up much further.

The shortage of pig iron has hit the nation's foundries more seriously than it has steel production. This was highlighted by the recent closing of pipe production at the Florence Pipe Foundry & Machine Co. at Florence, N. J. Jobbing and production foundries in the East are operating on skeleton schedules because of pig iron shortages. The inability of these small plants to obtain pig iron has forced them to bid up prices on the cast scrap market to fantastic levels. Even after paying the highest prices in cast history the general foundry situation is still one of extreme shortage of pig iron.

In the midst of the furor over steel prices, steel scrap prices turned slightly softer this week in one major consuming district and were unchanged in two others. Because of an average decline of 25¢ a gross ton at Pittsburgh, THE IRON AGE scrap composite this week is down 8¢ to $40. The composite this week is $1.83 a gross ton below the high since the first of the year reached in the week of Jan. 20 and $2.58 below the high for 1947 reached in the week of Oct. 28.

STEEL demand this past week was stronger than ever. There was no sign of a falling off in requirements for any steel products. Substitutions for flat-rolled steel items were still being sought by many customers. A record breaking gray market price of 26¢ a lb or $520 a ton for galvanized sheets was uncovered in the Middle West last week. But the purchaser must have been over the barrel for the material since such a price has been mostly in the dreams of steel gray marketeers.

Comments from Detroit indicate little anxiety over steel prices. Most automobile makers have merely said that if the price of steel goes up it will be reflected in higher car prices. Such a passing on, however, would have to be quite small if it is based on steel price increases alone.

• **CRIME DOESN'T PAY**—The latest case of highjacking steel shipments which was reported in the Jan. 22 issue of THE IRON AGE, has been solved by the FBI. The sheets left on a parked trailer on the south side of Chicago were stolen by a truck driver. The truck driver sold the 23 tons of 25 gage cold-rolled sheets to a sheet metal company in East Chicago, Ind., for a total price of $1300. The fence in turn peddled the sheets to a real estate broker in Indiana Harbor at 7¢ a lb, who in turn sold them to a metal products company in the state of Ohio for 8½¢ a lb. Oddly enough, the truck driver who eventually carted the hot sheets to Ohio, was instrumental in supplying the FBI with the necessary evidence. All guilty parties in the transaction have been apprehended and face three separate federal charges.

• **COMPLAINTS**—Complaints from Exporters to Congress over new foreign trade restrictions are about to result in action on Capitol Hill. Senate Small Business Committee is planning to hold open hearings on the operation of new regulations issued by the Office of International Trade. Loudest squawks are over OIT's action in (1) placing all exports under control, and (2) issuing export licenses to firms quoting lowest prices.

• **LIGHT METALS**—Kaiser-Frazer has ambitious plans for light metals in its future cars. Production is scheduled to begin in March on aluminum gas tanks weighing 11 lb to replace terne plate tanks weighing 28 lb. K-F is also seriously investigating magnesium wheels and rear doors in which a steel skin will be hemmed into an envelope over a die cast aluminum frame. Another possibility is die cast frames plus a steel skin for instrument panels.

• **STILL TRYING**—A House committee this week began consideration of a new legislative attempt to blast loose stocks of potential scrap held by War Assets Administration and other government agencies. The House bill, introduced by Rep. Patterson, R., Conn., is a counterpart of the Senate Bill, sponsored by Senator Martin, R., Pa., which is installed in the Senate Banking Committee (THE IRON AGE, Feb. 5, p. 111).

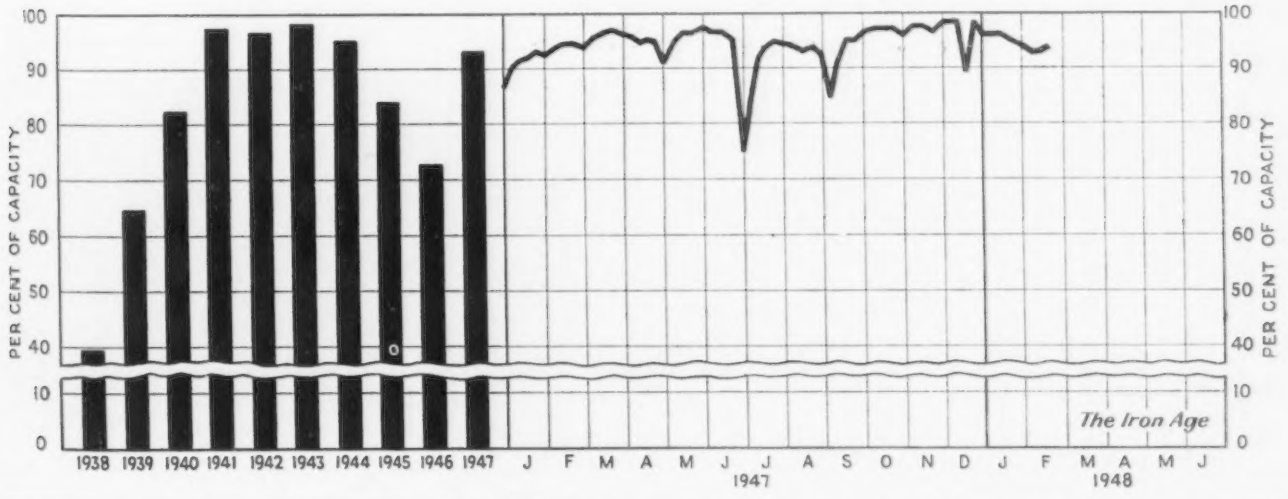
• **STEEL EXPORT**—Some 34,950 tons of finished and semifinished steel products will be shipped to Greece during the first half of 1948 under arrangements made by the Commerce Dept. with 29 steel mills. Similar arrangements have been made to send 550 tons of sheet steel to Iceland to be converted into drums for cod liver oil, most of which will be shipped into the United States. The steel for Greece is for general rehabilitation purposes and will consist of flat-rolled products, including plates, billets and bar products, as well as wire rods. Included in the export quotas, all shipments will be in transit within 90 days.

• **STRANGLE HOLD**—Ten pct of the British motor car industry is threatened with extinction or diversion to another trade as a result of shortened steel supplies unless their export quotas are maintained, according to a statement by G. R. Strauss, Minister of Supply. Necessity for the move is based on the high economic value of steel to Britain, and according to Strauss, where allocation quotas are not showing returns, the quotas must be reallocated.

• **NEW BELGIAN COMPANY**—New company to produce cold reduced sheets and tinplate has been formed by the John Cockerill Co. in Belgium. The company, known as Compagnies des Fers Blancs et Toles a Froid (Ferblatil) has a capital of $4,950,000. A new plant, including rolling mills, pickling lines, annealing furnaces and tinplate lines, will be erected at Tilleur, near the main works of Cockerill of Seraing. Plant material will be bought in the U. S. except for electrical parts which will be Belgian, and completion of the works is scheduled for 1950.

• **BETHLEHEM SHIPBUILDING** — Bethlehem-Sparrows Point Shipyard, Inc., has closed contracts for the construction of three 28,000-ton tankers. Two other ships of that class may be authorized, Arthur B. Homer, president Bethlehem Steel Co. revealed when speaking in connection with the launching of the ore carrier, Cubore, seventh of eight 24,000-ton bulk ore carriers being constructed at the yard. The program also includes four 18,000-ton tankers for foreign interests.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 17....	95.0	93.0	92.0	88.0	93.5	99.0	96.0	102.0	100.0*	96.0	102.0	82.5	79.0	93.0
February 24....	97.0	92.5	92.0	88.0	94.0	99.0	96.0	103.0	101.0	97.5	101.0	82.5	87.0	93.5

* Revised.

Quantity PRODUCTION of GREY IRON CASTINGS

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MAIN OFFICE AND MANUFACTURING PLANTS

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New Gray Market in Sheet Aluminum Brings Grief to Consumers

New York

• • • **Tightness in the** aluminum sheet market in the past 60 days has given birth to a new gray market. Lucky warehouses with big sheet aluminum stocks are getting at least as high as 10¢ per lb above "normal" warehouse prices for immediate delivery. The customers, as in any tight market, are getting stuck.

Due to power shortages, and for other causes, aluminum mills have been cutting down on quotas to their customers. At the same time the annoying continuation of the steel sheet shortage is driving more manufacturers to attempt to get aluminum to substitute for it.

Many sheet metal consumers have long known that they could substitute aluminum for steel, but that it would cost them a lot more money for most applications. As the gray market price of steel sheets has kept on its upward path, the steel price got up above the mill price for aluminum for more and more jobs.

To rectify this awkward situation, many warehousemen and brokers are now quoting up to 50¢ per lb for scarce types of aluminum sheet and coil products. The material that they are selling is primarily material they have picked up from manufacturers' excess inventories when the aluminum situation was easier. They claim that surplus stocks left over from the war have nearly all been used.

While highly desirable flat rolled aluminum products are bringing premiums up to 10¢, many other lines are fairly easy to sell at 3¢ to 5¢ above the regular mill quotations. Bars, rods, and tubes are just coming into their own as items which can definitely command higher than regular mill or warehouse quotations.

Opinion among both aluminum users and the warehousers and brokers who are selling at the new low prices, is that the trend in this line is up. They feel that even higher prices will be paid in the near future. One warehouseman even claims that he can get premiums for foundry ingot aluminum right now.

Steel Sheet Shortage, Lower Aluminum Mill Quotas Receive Blame

° ° °

By JACK R. HIGHT
Ass't News-Markets Editor

° ° °

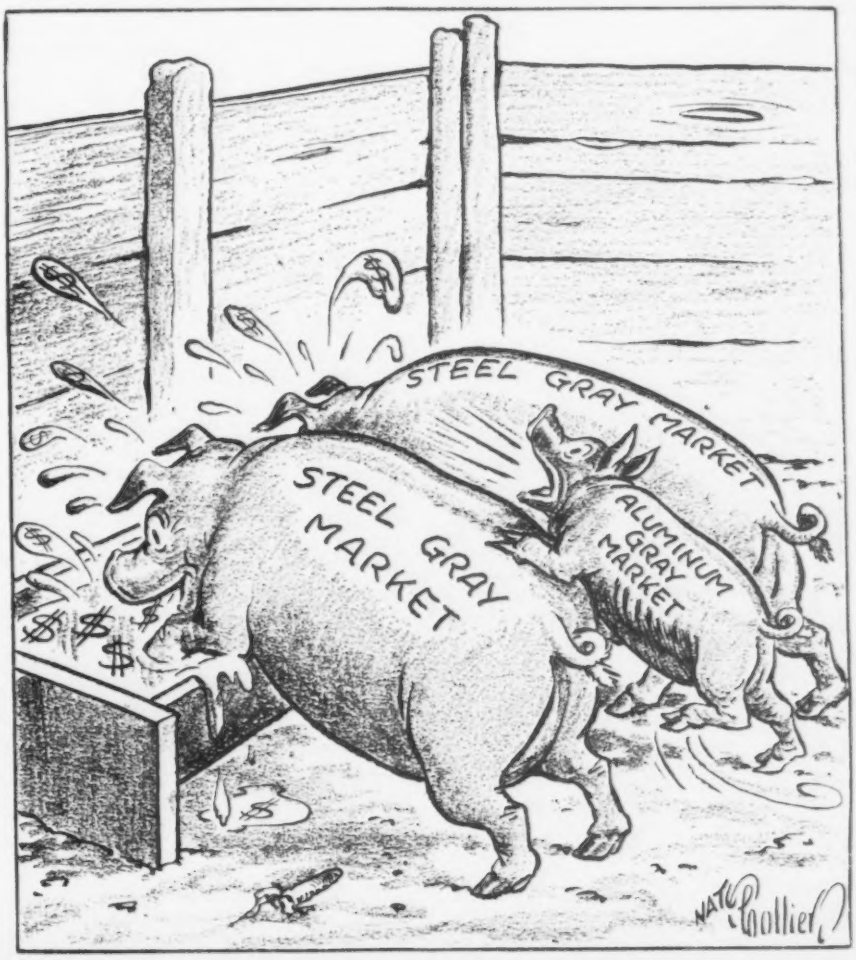
Against the position of the high priced warehouses advertising that they can deliver immediately, regular warehouses that buy from mills, and the mills themselves, are in tough shape. They can offer 8-to-6-month delivery if it looks as if the customer will be an important one in the long pull. Otherwise, it is very hard for a new sheet customer to get on the books for a shipment of aluminum.

There are varying estimates as to the probable life of the tight sheet situation. It is at present operating most actively in the East and the Middle West. Some sources feel that the operation of new sheet capacity now being completed will increase the availability to the extent that three to six months will wipe out the shortage.

Others feel sure that as long as there is a steel sheet shortage there will be a tight situation on aluminum. Even THE IRON AGE is not willing to guess how long that may be.

For the most part, operators who are selling the stuff are novices, though they may be pretty hard bitten novices. For the most part they are completely unappre-

Get Yer Feet Outa the Trough



ciative of the advertising value of publicity. Even ones that profess to be selling at mill prices or below that level show extreme shyness when called on by the press. Some might even be described as uncooperative. As in the case of men selling $300 steel, their credit terms are somewhat limited. Certified check on the barrelhead is about the only language that they know.

While 50¢ per lb is probably higher than regular quotations, 0.032 in. x 36 x 96 sheets in 2SO are being traded at 33½¢ per lb—about 7½¢ above the regular mill price. Standard prime 3S half hard sheets 0.025 in. x 36 x 96 are going at 36.8¢ per lb, about 10¢ over the regular mill price. In the East, sellers who have stocks for immediate delivery are regularly asking 5¢ to 10¢ premium for the advantage of promptness.

In addition to the out and out quotations substantially above the regular figure, numerous dodges are being used to increase charges by firms which haven't the courage to come out flatly and declare themselves for higher prices. Quantity price deductions allowed by the mills are often not being allowed by the warehouses, for example. The man that is buying aluminum in large quantities, then, is paying as though he were a small quantity user.

Employee Steel Buying Plans Under Scrutiny

Pittsburgh

• • • **Another gray market** steel leak is plugged. Pittsburgh Steel Co., discovering that the employee buying privilege was being abused, drastically modified it. Among other large nail and wire makers, both Jones & Laughlin and American Steel & Wire no longer permit unrestricted employee purchases. All say, however, that their policy is loose enough to permit an employee in tight strait to buy needed material.

Nails, one of the hottest gray market items, were being bought by some Pittsburgh Steel employees in amounts up to 5 kegs on a certificate that they were for the employees' own use. The company learned early this month that some employees had bought nails for about $7 a keg and sold them to a "broker" for $12. When the company found out about it a truckload was en route to a Connecticut builder. Pittsburgh Steel moved. A wire went to New York, the truck was stopped and the shipment returned to Pittsburgh.

Pittsburgh Steel will reimburse the employees at the price they paid for the nails. No disciplinary action is planned, but it won't happen again. A company spokesman said that this will not prevent any employee who needs any of its products for his own use from obtaining them but the need will be carefully checked before any purchase orders are honored.

Jones & Laughlin Steel Corp. cut back on employee purchasing during the war. However, according to a company spokesman, any employee who personally needs wire, nails or pipe can get them through the company upon proof that his needs are genuine.

American Steel & Wire Co., Cleveland, has not had any formal policy for sale of nails or any other product to employees since before the war, according to a company spokesman. "All of our distribution is through normal channels of trade," he added. "This does not mean, however, that an employee, perhaps a veteran of World War II, unable to have a home completed because of a keg of nails, has not been taken care of by the company."

Relax Customs Regulations on Scrap

Washington

• • • **Relaxation of customs regulations applying to imported scrap this week is permitting the Bethlehem Steel Co. to unload directly at its Sparrows Point, Md., works part of a 1 million ton purchase of scrap from China and the Pacific.**

Announcement of the temporary revisions in customs rulings applying to scrap imports was made by Senator Wherry, R., Nebr., chairman of the Senate Small Business Committee, and John R. Steelman, assistant to President Truman.

Bethlehem's purchase of the 1 million tons from the Orient was due to begin arriving on the East Coast last week in three separate cargoes, according to Senator Martin, R., Pa., chairman of the steel subcommittee of the Small Business Committee.

Earlier, customs officials had demanded that the scrap shipments be held in bonded warehouses until actually ready for furnaces. Letters then were exchanged between Mr. Steelman and customs officials on relaxation of the regulations—a step which Senator Martin said would "establish a precedent for other and future commercial recoveries of scrap from foreign areas."

Bethlehem is reported to have paid the Chinese Government between $10 million and $12 million for the battle scrap which China received in settlement of a wartime debt. Company officials have described the transaction as the largest purchase of scrap in Bethlehem history.

The change is made effective in Amendment 2 to Foreign Liquidation Commision Regulation 8.

Coal Pioneer T. Moses Dies

Pittsburgh

• • • **Thomas Moses,** former president of the H. C. Frick Coke Co. and later vice-president of U. S. Steel Corp. of Delaware, died Feb. 20 at Danville, Ill. He was 78 and had served more than 50 years with U. S. Steel subsidiaries at the time of his retirement in 1945.

He started his career in the coal mines in 1880 at the age of 11 and became a miner at the age of 14. From 1910 to 1915 he was superintendent of the Westville, Ill., operations of U. S. Fuel Co., and became general superintendent in 1915.

Mr. Moses was elected president of H. C. Frick Coke Co. and other coal producing subsidiaries of U. S. Steel Corp. in 1927. In 1938, when he became vice-president, raw materials, U. S. Steel Corp. of Delaware, his son, Harry M. Moses, succeeded him as president of the coal mining subsidiaries.

Formula Prices for Openhearth Scrap Pass Major Test

Buyers More Optimistic As They Dispel Idea Formula Is Floor and Ceiling

o o o

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

o o o

Pittsburgh

• • • **"Formula prices"** for openhearth steel scrap have passed their major test with a better than passing grade. Introduced late last November, they went through heavy weather for several months. Mills' threats to take off openhearths before exceeding them were greeted with scorn. But the threats were not empty. Next, heavy purchases at formula prices early in February were hailed by consumers as a victory sign. Then, in the week of Feb. 16, the openhearth scrap price actually broke in Chicago. A week before that it had eased in the Philadelphia district.

Buyers admit that their success to date does not prove the market is on a long term downward trend. But they do believe they have shown that the formula prices are not floor prices; they are ceilings. It was a tough battle. More than once hard pressed mills stepped out and topped them; but they bought in limited quantities, a few carloads at a time so as not to upset the market.

The coup de grace was delivered in January when mills suddenly wised up to the fact that they were slitting their own throats by allowing some ingot conversion deals to be made with their blessing. Buyers of scrap to make the ingots in these deals had been forcing up scrap prices. Mills cracked down by refusing to reroll ingots obtained from such sources. It is believed that if those who make conversion ingots refrain from upsetting the market in the future their ingots will again be as acceptable as anyone else's.

Now that steel producers have shown they mean business, trade sources believe formula prices will constitute ceilings in the openhearth grades, at least for the immediate future. Proving they meant what they said was costly to steel output. Mills in several districts, notably Chicago and Buffalo, actually took off substantial numbers of openhearths when they couldn't get the scrap they needed at the formula price.

Scrap purchasing agents indicate that their next goal will be to generally drive openhearth scrap prices down below the formula. They may then try to bring the other grades into line with openhearth steel. Theoretically, all other grades of steelmaking scrap should bear a fixed ratio to openhearth material. The ratios are the plus and minus figures set in former Office of Price Administration schedules.

To date this has not been generally accomplished. There is some doubt in the trade that it can be done. The reason is basic: OPA prices were based on No. 1 heavy melting steel. Even a good grade of heavy axle turnings was not quite comparable to scrap that really met the specifications for No. 1 heavy melting steel. Today that ratio doesn't hold in most districts because openhearth scrap is not at all comparable to No. 1 steel.

The formula prices generally accepted in the trade are quoted in the accompanying table. The term "basing point" is similar to that used in selling steel products. A mill located at a $2 freight rate from Canton, Ohio, for instance, would not—under the formula—pay more than $42 delivered for openhearth scrap. This figure is arrived at by taking the Canton delivered price of $40.50 per gross ton and deducting the 50¢ switching charge to find the f.o.b. Canton price. The freight from Canton is then added. Delivered prices for shipments from New York, New Jersey and New England to Pittsburgh, for example, are calculated by adding freight from those points. No switching charge is deducted on shipments from those points. Basing point price quotations include brokers' commission.

Scrap Bases

Basing point	Price per gross ton	Switch. chg. per gross ton
Ashland, Ky	$40.00	$ .50
Atlanta	37.50	.45
Bethlehem	39.00	.50
Brooklyn	35.03	..
Buffalo	39.75	.50
Butler, Pa.	40.50	.50
Canton, Ohio	40.50	.50
Chicago	39.50	1.25
Cincinnati	40.00	1.10
Claymont, Del.	39.00	.40
Cleveland	40.00	.80
Coatesville	39.00	.50
Conshohocken	39.00	.50
Detroit	37.50	1.00
Duluth	38.75	.40
Farrell, Pa.	40.50	.50
Gadsden, Ala.	37.50	.45
Harrisburg, Pa.	39.00	.50
Houston	34.50	.50
Johnstown, Pa.	40.50	.50
Kansas City	37.00	.50
Kokomo, Ind.	39.50	.40
Massillon, Ohio	40.50	.50
Midland, Pa.	40.50	.50
Middletown, Ohio	40.00	.40
New England	32.40	..
New Jersey	36.17	..
New York City	35.03	..
Phoenixville, Pa.	39.00	.50
Pittsburgh	40.50	.75
Portsmouth, Ohio	40.00	.40
Sparrows Point, Md.	39.00	..
St. Louis	38.50	.40
Steubenville, Ohio	40.50	.50
Struthers, Ohio	40.50	.50
Warren, Ohio	40.50	.50
Weirton, W. Va.	40.50	.50
Youngstown	40.50	.50

Foundry Workers Now On 40-Hour Work Week

Washington

• • • **Workers in three** out of four ferrous foundries in 23 major industrial cities are now on a 40-hour week schedule, according to the BLS, and nine out of ten establishments have made provision for paid vacations.

Since January 1945, the BLS noted, the average wage (straight-time) has gone up 30 pct. The greatest gain was in the Birmingham district where the general wage rate has been increased 40 pct.

Of the eight foundry occupations studied, wood pattern makers were the highest paid, ranging from $1.42 an hour to $2.10. Machine and bench molders remained among the higher paid workers, averaging $1.70.

Pig Iron, Scrap and Co

Industry's Backlog of Orders For Pressure Pipe Nears One Million Tons

o o o

By JOHN ANTHONY
Eastern Regional Editor

o o o

HOT STUFF: *Molten pig iron is shown flowing from the blast furnace into the ladles at the Gary Works, Carnegie-Illinois Steel Corp.*

• • • **The plight of** the nation's foundries, suffering severe shortages of pig iron, cast scrap and foundry coke, is highlighted by the closing down of the pipe production of Florence Pipe Foundry & Machine Co. on Feb. 9 following a week's operation with a single shift. Florence officials do not expect to be able to reopen its operations until mid-March, probably on a one-shift basis. With a conservatively estimated capacity of 9000 tons of pressure pipe per month, this shutdown is a real setback to municipalities anxious to extend water and gas supply lines to permit housing developments to proceed.

The pressure pipe industry's current backlog of orders, as reported by the Dept. of Commerce, is approaching a million tons, up one-quarter of a million tons from a year ago. Soil pipe backlogs, meanwhile, are below 300,000 tons, down 70,000 tons from a year ago under the impetus of subsidized production of pig iron for this purpose. The gray iron foundry industry backlog, aside from pipe foundries, at the end of November was reported at 2,687,000 tons.

Eastern Pennsylvania and northern New Jersey foundries have been hit harder by the pig iron shortage than any other area in the country. Before the war, iron for foundries in this market came from Bethlehem, Sparrows Point, Buffalo, Birmingham, Birdsboro and Swedeland, Pa., and from as far west as Cleveland. Now the only important tonnage of free market foundry iron coming into the district is from Swedeland.

Some Sloss-Sheffield Birmingham iron is going to United States Pipe & Foundry Co. at Burlington, N. J., who hold a majority of Sloss stock, but their pig iron charge has been reduced from a normal 80 pct to 60 pct, said to be the minimum permitted by the deLavaud centrifugal pipe casting process.

Birdsboro foundry iron is going to Warren Foundry & Pipe Corp. at Everett, Mass., and Phillipsburg, N. J., under an exclusive marketing agreement between E. & G. Brooke Iron Co. and three consumers to take practically all Birdsboro production.

Jobbing and production foundries in this area are operating on a spotty schedule at a rate of no more than two to three days a week. They are required to bid for cast scrap against steel mills in eastern Pennsylvania that are hard pressed by the shortage of pig iron available to them. Pricing castings at 12¢ to 14¢ per lb in some instances, they are better able to pay high delivered prices for what foreign and remote pig iron they can get and are able to bid up the price of cast scrap.

Shortage of cast is so acute that No. 1 cupola is now being sold to consumers on a 100 lb basis in this market at $2.75. Pipe foundries are unable to compete in this manner, as their principal customers are municipal authorities whose cost estimates must be reasonably close to delivered cost.

All pipe foundries have been operating during the year on a hand-to-mouth basis for pig iron. The Warren Foundry & Pipe Co. plant at Everett was closed down last week awaiting the arrival of 800 tons of Brooke iron en route to the plant. Florence Pipe has reduced its normal 30 pct pig iron charge to a small percentage of the melt and, when even this tonnage became unavailable, was forced to close down. The normal pig iron consumption of Florence is close to 800 tons per week.

A year ago the Florence stockpile of cast scrap amounted to 9000 to 10,000 tons. United States Pipe had during the war a huge stockpile of unstripped motor blocks. These reserves of scrap have been consumed and both producers are now largely dependent on the dealer scrap market for week-to-week operations. Winter weather has retarded yard activities during the past month, resulting in reduced tonnages and marked increases in price.

For a while one large gray iron foundry worked a new version of

Coke Shortages Cause Shutdown of Foundry Pipe Producer

the original scrap-for-steel deal. It bought blast furnace grades of turnings and shipped them to a merchant furnace at a price reportedly below the market quotation and in return was permitted to buy pig iron.

Florence scrap consumption late last year was averaging 1500 tons per week, as compared with a normal consumption of about 1000 tons per week to meet the present production rate. The increased consumption of scrap is required by the drop in the pig iron charge. No. 1 heavy melting steel scrap is added to the charge to the equivalent tonnage of pig iron charged.

It has not been found possible for the foundry to drop below the minimum pct of pig iron charge because of the need for 3.20 pct C in the cast pipe. Carbonizing agents of many types have been added to the heats with varying degrees of success, but there is a point above which it has not been found possible to raise the carbon content by use of these agents. The company is now experimenting with the use of lump graphite in the charge.

Florence's production of cast pipe in 1947 was 101,000 tons, using 16,000 tons of pig iron. By way of comparison, its 1930 production was 117,000 tons, using 60,000 tons of pig iron. These figures may be considered typical of pressure pipe production, and yet the industry's output of pipe by footage is estimated to have been higher in 1947 than in any other peacetime year. One producer estimates its current backlog of orders on hand at 9 to 14 months' production, depending on pipe size.

Foundry coke supply is almost as big a headache as pig iron and scrap. Byproduct foundry coke is unavailable in many areas. Foundries have been generally required to resort to beehive coke of a quality that is getting progressively poorer. Its use requires the addition of larger amounts to the charge, thereby adding further to foundry costs.

Pittsburgh foundries are limping along on a hand-to-mouth basis but so far none has been forced to close down. Most foundries are running 5 days a week, and a few are operating only 3 or 4 days. Cast scrap is short, and quotable in the neighborhood of $60 for large sales. But, since foundries can't wait for dealers to accumulate a carload, they buy by the truckload and pay $65 or more a ton for it. Stove plate is sold as No. 1 cupola but consumers do not object.

Pittsburgh coke supply at this time is not as desperate as most foundries expected with the 25,000 tons per month of the Domestic Coke Corp. at Fairmont, W. Va. practically out of the merchant trade on Feb. 1. Foundries are now getting three cars of beehive instead of one of byproduct and two of beehive. One or two cars of byproduct have recently come into the district from Texas at $27 delivered.

Pittsburgh Coke & Chemical Co.'s Neville Island furnace, the only merchant furnace in the Pittsburgh district, isn't producing its rated 750 tons a day. Pittsburgh Steel Co. is making no promises on iron from its recently purchased government-built furnace at Monessen. Trade opinion is that the iron will be diverted to its own needs when the furnace is finally blown in in the spring.

The Cleveland foundry supply position is about as short as at Pittsburgh. The Republic Steel Corp.-operated DPC furnace sought by Preston Tucker for automobile production is a principal source of local foundry iron.

The problem of increased foundry costs has been studied carefully by most foundries. From a typical foundry raw material study of 40 items, only two, core oil and mixed oil, show price decreases. All other items were increased during the year to the peak rise of 73 pct for fuel oil. Other significant items of cost increase are shown in the table.

Foundries see no early solution to their problem of shortages. Basically it is a problem tied to the tremendous current demand for steel products which has prompted steel producers to divert almost all their pig iron production to the needs of their own openhearths. Foundries point out that only 2 pct of the country's pig iron production would be required to place the foundry industry on a full-time-operations basis.

Mills, on the other hand, are pinched by a long term scrap shortage. They have used nearly all their pig iron to avoid bidding available scrap to higher prices. So far the mills have been fairly successful in holding down scrap prices. There is hope in mill and foundry circles that the spring will bring a flood of scrap, with lower prices and more merchant pig iron for sale.

Of a total pig iron production of 58,222,027 tons in 1947, shipments to others than steel producers and independent ingot mold producers were only 5,498,480 tons as reported to the American Iron and Steel Institute. Shipments other than for mills' own use included 2,852,744 tons foundry iron, 2,266,627 malleable, and 780,661 tons low phos, intermediate low phos and bessemer. Shipments to other than steel and ingot mold producers in 1946 were only 4,576,663 tons, out of a total production during 1946 of 44,621,199 tons.

Foundry Cost Increases

Pct increase in raw materials prices from Jan. 1947 to Jan. 1948

Pig iron	37.5
Scrap	42.9
Home scrap	66.7
Iron ore	21.7
Ferrosilicon, 50 pct	20.4
Spiegeleisen	15.3
Fuel oil	71.9
Furnace extras	43.9
Foundry sand	5.6
Other sand	19.1
Bentonite	13.0
Mogul	36.3
Shot blast	60.7
Dry core compound	44.5
Binder	9.2 to 34.3
Silica core wash	52.0
Coal	27.6
Shop coke	27.1
Silica clay	15.7
Limestone	16.9
Petroleum coke	35.5

Steel Drama . . .

Leave It or Leave It — *A Steel Fantasy in One Act*

The SCENE *is the office of the* SHEET SALES MANAGER, *Blank Steel Corp., a fair sized integrated producer; a single straight-backed chair in foreground; an inposing desk at the rear. Giant floodlights above the desk shine on the occupant of the chair,* O. K. DOAK, *president, Amalgamated Stamping & Mfg. Corp. Behind the desk and almost obscured by the glare of the floodlights is the* SHEET SALES MANAGER, *Blank Steel Corp. The atmosphere is that of a police station third degree chamber.* DOAK *came to town with his board chairman and several other key men. The board chairman is now in the hands of the* VICE-PRESIDENT, SALES, *Blank Steel Corp., who is getting him royally anesthesized at the Marquette Club. The other key men wait in an anteroom in case they are needed.*

SSM—Mr. Doak, your petition for 100 extra tons of sheets is up for review. Our anti-gray market committee has awarded you the maximum 5 points after a 6-week investigation of your company's integrity. Because your firm is 100 years old you get another 4 points. We've reviewed your animated presentation on your future plans and as soon as we can get 5 extra freight cars it will be shipped back to you. A splendid presentation, Mr. Doak, and worth 2 points any day. Our auditors have checked your books— that $4 million cold cash in the bank is worth another 4 points. And I can assure you that the fact that your plant is 20 miles from our mill won't be held against you.

O. K.—But sir . . .

SSM—Just a minute Mr. Doak, you have 15 points, do you want to try for more?

O. K.—I guess I'll have to.

SSM—Is it true that in May 1937 you bought a carload of steel from an Eastern mill?

O. K.—Yes, but that was . . .

SSM—Sorry, that will cost you one point. Take off one Miss Toddle.

O. K.—But we bought four carloads from you that month.

SSM—Oh yes, but *(he points an accusing finger)* we had to shade our price $2 a ton to get that business. That'll cost you another 4 points Mr. Doak.

O. K.—*(Plaintively.)* We shipped you 1000 filing cabinets you said you needed this year to hold correspondence from politicians and the like.

SSM—*(Gloatingly.)* Ha, Ha! That reminds me. I'll give you 3 points as a bonus for your cooperative attitude but—HOW MANY SENATORS DO YOU KNOW?

O. K.—*(Obviously doesn't get the drift of this question; rather proudly he replies.)* Oh, half a dozen or so.

SSM—Under this system, my friend, we rate Senators. Most of them will cost you points, some more than others; a few rate zero and some are even worth one point. Let me have their names please. (DOAK *writes furiously and hands the list to the* SHEET SALES MANAGER *who checks the names against a card file.)* Those names will cost your company 9 points, Mr. Doak.

O. K.—We are interested in some stainless sheets.

SSM—*(Making a feeble effort at sounding casual.)* Well sir, that's not my department but if you take 25 tons of stainless with 100 tons of carbon sheets we'll add 25 points to your score.

O. K.—Well, that's a little high but I suppose we could use 'em on our garbage can line; might even gold plate 'em and sell 'em to kings and the like.

SSM—We have a special on wire rope this week—one point per thousand feet.

O. K.—We'll take 10 points, I mean 10,000 ft.

SSM—Now for your scrap return record. *(He hauls out a huge folder from his desk.)* Our records, Mr. Doak, show an average of 15.7 pct of the sheet tonnage shipped you was returned to us as scrap over the past 2 years. But for the past 3 months you've shipped back only 14.9 pct. That's serious! Perhaps you can explain?

O. K.—We made ash trays from some small clippings. Got a nice price too. But if you think that unfair . . .

SSM — Wouldn't it be better to make them of stainless strip? We could probably let you have a bit of that—1000 tons if you want it.

O. K.—Could we settle for 10 tons?

SSM—Very well, and with only 3 points off for carelessness on scrap return you still pick up 7 points. Toddle up the total Miss Total—I mean total up the toddle—Oh rats! How many points has Amalgamated amassed?

As Miss Toddle punches the adding machine DOAK *gropes for the coat, vest and tie he shed during the "interview." He is sweating profusely and is half blind from the floodlights playing into his face. Miss T. hands the SSM the adding machine tape.*

SSM—I'M SORRY sir, you made only 46 points. This quarter's bogey is 50. But a box of cigars to you, Mr. Doak.

SSM *reaches across his desk with the cigars but* DOAK *has passed out cold. As if by instinct his key men sweep in from the anteroom. There is no surprise on their faces. They put their president on a portable stretcher and start for the door. Before they get there it flies open and two very distinguished gentlemen burst in. Their arms are around each other's shoulders. They are mellow as cellos. One is the steel company's* VICE-PRESIDENT, SALES; *the other is Amalgamated's board chairman. T. Skeffington Skeffington IV.*

V-P SALES — (*Addresses his* SHEET SALES MANAGER.) Gus, We're giving good old Skeff the 200 tons of sheets he wants. You can work it in somewhere . . .

SSM — (*Stumbles over to the stretcher bearers.*) Doak. (*he croaks.*) Move over!

• *One of our district editors, fed up with reports of voluntary allocations and the complaints about the steel companies' own systems cooked up this play. He's not sure it would work either.—Ed.*

C. M. White Explains Higher Price Moves In Letter to Iron Age

Editor
Iron Age
New York

Dear Sir:

"In your **News Summary** of Feb. 19 you observed that talk by steel officials advocating lower steel prices has not been supported by recently announced price increases on pipe and semi-finished steel and others made since the first of the year. You add, 'It could possibly be that some of these increases are anticipating the wage demand to be made this week by Philip Murray, steel union head.'

"May I comment on the first statement. Not only have I not advocated lower steel prices, but quite to the contrary, I have publicly declared and still do firmly believe that steel prices are not high enough to assure the industry of firm financial experience in the months and years to come—unless some material reduction in our present costs comes about. This certainly is not foreseeable at the present time.

"By comparison with other industries the steel industry operates on a very low profit margin. For a long time profit ratios in the iron and steel industries have been decreasing. For the period 1909 to 1927 the industry's profit on sales averaged 10.5 pct. For the subsequent period from 1928 to 1946 profits averaged 4.5 pct of sales. In 1947, an all-time record year for steel shipments for Republic, the company's profit on each dollar of sales was only 4.77 cents.

THE IRON AGE *steel price composite is constructed from the base prices of finished steel products. It does not reflect extra charges (specific charges for certain chemical and physical characteristics added to the base price) which all consumers pay in varying amounts.—Editor.*

"In the face of tremendous increases in costs, we have held our prices to the lowest possible level. Since 1939 steel wages are up 85 pct, coke is three times as high and scrap is two and one half times as high as in that year. As against this, the average price of steel, as shown by the composite index compiled by your magazine, has gone up only 38 percent.

"As a result of increased costs, there are some steel items which we are producing at a loss today. This situation is being given serious consideration for we must have our house in order to face a decline in operations when and if it comes.

"Although profits in Republic attained a record high of $31 million in 1947, the stockholder was not benefited proportionately, since a large part of this profit was plowed back into the company to compensate for increased cost of replacements of buildings and equipment over and above that allowed by current depreciation.

"Steel is the lowest priced of all metals. It is low in cost because it has been produced in tremendous volume. Despite progress made in increasing efficiency of steel making facilities in recent years, additional costs of material and labor have far surpassed these. As the quality of free-shipping lake ore declines and high quality metallurgical coal becomes scarcer, increased production costs are inevitable. In the face of such conditions unless there is a reduction in other costs somewhere along the line, steel prices must go up.

"The present profit margin at which the steel industry operates is too low to encourage new capital. New capital is going to be needed to finance the improvements and replacements which must be made in the near future. The tremendous cost of beneficiating facilities for the lower grade lake ore, for example, will take many millions of dollars. Where will investors be found who will risk this capital to attain a doubtful return of only a few cents on each dollar?

"Now, concerning your second observation that current increases are anticipating expected wage demands. It might be more accurate to say that recent price increases are attempting to compensate for *past* wage increases which were foisted upon the public behind a smoke-screen set up by phony economists and former department of commerce new dealers. These alleged experts contended repeatedly that steel wages could be increased without a corresponding increase in prices. This absurd fabrication has proved false, and has directly contributed to the current inflation the nation is experiencing. Despite that fact, these same economists are dusting off the old placard again—this time contending that the industrys' 1947 high profits can soak up wage increases. Again may I point out the 1947 profits meant very little to the stockholders in increasing dividends and that even more profitable years than 1947 in the steel industry are what must be normal years if we are to encourage the investment of new capital.

Very truly yours,
C. M. White
President
Republic Steel Corp."

No Quarrel

• • • "We have no quarrel with the views expressed by Mr. White in a letter to the Editor of THE IRON AGE which was distributed Friday a.m. to newspapers and wire services. Mr. White's views on the question of steel prices are not necessarily shared by some other steel leaders. Two major steel heads, since the first of the year, have expressed the view that they would like to see steel prices lower and no more wage increases. THE IRON AGE story stands as published."—Editor.

Canadian Output Of Ingots and Castings Dipped in December

Toronto

• • • **Canadian production** of steel ingots and castings during December amounted to 249,769 net tons, equivalent to 84.5 pct of rated capacity, and compares with 255,372 tons or 86.3 pct in November and with 237,300 tons for November, 1946. Output for the month under review included 241,065 tons of steel ingots and 8704 tons of steel castings.

Charges to steel furnaces in December included 123,240 tons of pig iron, 74,451 tons of scrap of consumers' own make and 69,523 tons of purchased scrap.

	Steel Ingots	*Castings*
January	243,557	6,241
February	223,124	6,098
March	263,193	6,539
April	244,398	7,158
May	235,978	8,098
June	230,581	7,716
July	226,443	5,898
August	226,180	7,574
September	225,457	8,731
October	247,171	9,290
November	246,785	8,587
December	241,065	8,704
Total, 1947	2,854,532	90,634

Congressional Hearings On Steel Gray Market Slated for March 1st

Washington

• • • **Congress is getting** ready to take another—and closer—look at steel gray markets.

Rep. Macy, R., N. Y., chairman of a House Public Works Subcommittee, told THE IRON AGE this week that he will begin new gray market hearings on Mar. 1, but warned steel consumers that legislative correction of abuses in distribution "depends to a large extent" on the cooperation of end-user.

"Many manufacturers who complained bitterly of the situation are reluctant to disclose the sources from which they are forced to purchase fabulously-priced steel for fear that even these sources might be closed to them," Mr. Macy asserted.

"However," he added, "the success of our committee depends to a large extent on the cooperation of just such manufacturers."

Members of congressional committees investigating gray market practices have commented that steel consumers who squawk the loudest about abnormally high steel prices frequently close up like clams when asked to name their suppliers.

Mr. Macy continued:

"If all companies being forced to purchase black or gray market steel would furnish this committee with the name of the vendor, together with any supporting data, such as correspondence, purchase orders, invoices, cancelled checks and other similar documents, much could be done toward eliminating these unethical trade practices.

"The committee will, if so requested, consider all such information as coming from a confidential source, whose identity will not be disclosed," he declared.

The Macy subcommittee's investigations so far have been directed principally toward the sale of steel and steel products in New York, Massachusetts, Illinois, Pennsylvania, Texas and the Ohio-Kentucky area.

"From the evidence gathered to date," Mr. Macy stated, "it is clear that most gray market steel flows to the end-user through one of several well-defined channels. It is the present intention of the subcommittee to hold hearings designed to expose this situation and present a cross-section of the entire steel picture as it exists today."

In the complete absence of any specific legislation against any dealer charging whatever he chooses for steel or other products, the committee will hope that it can turn up evidence that the parties involved have violated some general law on the books. No new legislation in any form is contemplated. In addition, the committee hopes that publicity attracted by the undertaking will be as harmful to brokers in steel as it will be beneficial to politicians in an election year.

U. S. Steel Export Co. Lists Price Increases

New York

• • • **In accordance with** recent price increases by United States Steel Corp., the following are U. S. Steel Export Co.'s base prices effective Feb. 13, 1948. They apply to export shipments with export freight included to New York, Philadelphia or Baltimore, all subject to adjustment to seller's prices in effect at time of shipment from mill. All prices are net cash.

Billets, Blooms and Slabs:	
Rerolling quality	$59.50 Net Ton
Forging quality	68.50 Net Ton
Skelp	3.68 100 lb
American Standard Pipe T & C	
Buttweld — 2½" and 3"	
Black	47.7% discount
Galvanized	31.7% discount
Seamless — 3½" to 6"	
Black	41.7% discount
Galvanized	25.2% discount
English Gas Tubes, T&C	
Buttweld — 2½" and 3"	
Black	47.0%
Galvanized	34.0%
Ingots	
Re-rolling Quality	$59.50 Net Ton
Forging Quality	60.50 Net Ton
Tube Rounds	83.50 Net Ton

Monarch Reports Earnings

Sidney, Ohio

• • • **Net earnings of** Monarch Machine Tool Co. for the fiscal year ending Dec. 31, 1947, totaled $726,406, equal to $3.46 per share on the 210,000 shares outstanding, compared with $3.23 per share for the previous year.

Gross sales for the year totaled $8,616,428 composed entirely of machine tools and accessories. This exceeds gross sales of 1946, which were $7,368,712.

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STABLE PACKAGING: *Stable isotopes get stable packaging before shipment from the Oak Ridge electromagnetic process plant where stable isotopes are concentrated. The vial containing a sample will be placed in a larger bottle on the table to the right, which in turn will be placed in the cardboard container to the left. The container then will be wrapped securely and readied for shipping.*

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Weekly Gallup Polls . . .

Voters Support Action to Raise Minimum Wage to 75¢ an Hr.

Princeton, N. J.

• • • **Two out of three** voters believe Congress should pass legislation raising the minimum wage for workers to 75¢ an hr from the present level of 40¢, according to George Gallup, director, American Institute of Public Opinion.

President Truman in his State of the Union speech last month urged the lawmakers to take this step. Last May a bill embodying the proposal was introduced in the House by Rep. Gerald W. Landis, Indiana; it is now in the House Committee on Education and Labor.

Representative voters in every state were interviewed by institute field reporters and asked this question:

"At present the minimum wage that can be paid to workers in every state, in most businesses and industries is 40¢ an hr. This means that all persons working in such businesses, in every state, including young people who have never worked before, can not be paid less than 40¢ an hr. Would you approve or disapprove of raising this minimum to 75¢ an hr.?"

The vote:

	Pct
Raise minimum wage	66
Don't raise	29
No opinion	5

The proportion of voters wanting something done about boosting minimum wages has remained steady during the past 2 years. In March 1946, when the proposed increase was only to 65¢ an hr, an identically worded question resulted in practically the same percentages as today's poll.

Since that time the public has watched food prices mount and seen organized labor obtain two rounds of wage increases, all of which probably tends to confirm the average voter's view toward wage minimums.

Farmers and professional and business people give the proposed boost the least hearty support, while manual workers vote better than five to one in approval. Union members, whose wages in general are above minimums, are even more strongly in favor than unorganized workers. Seven out of ten Democratic voters approve, compared to six out of ten Republicans.

One-third of the voters feel that a beginner's earnings these days should be between 75¢ and $1 an hr. This is revealed in the answers to a different question asked of a comparable cross-section. These voters were asked:

"What would you say the minimum wage per hour should be today for a single person, just graduated from high school, and starting out at a beginner's job in a factory in this area?"

The answer:

	Pct
Less than 40¢	1
40¢ to 75¢	39
75¢ to $1	35
$1 or over	18
No answer	7

When asked to give the main reason for the figure they mentioned, most voters named the current high costs of living.

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• • • **Complete returns** from an up-to-the-minute survey of representative voters throughout the country reveal surprising strength for Harold E. Stassen in a three-cornered presidential "trial heat" against President Truman and Henry A. Wallace.

Although Stassen trails the President nationally in terms of the popular vote, the former Minnesota governor takes the lead when the vote of South is excluded. His strength is relatively greater than Truman's for the rest of the country which casts 383 electoral votes out of the total of 531.

The question put to voters was this:

"If the presidential elections were being held today, and Truman were running for President on the Democratic ticket against Stassen on the Republican ticket and against Wallace on a Third-party ticket, how do you think you would vote—for Truman, Stassen, or Wallace?"

The national results:

	Pct
Truman	45
Stassen	41
Wallace	6
No opinion	8

When traditionally Democratic southern states are excluded, the three-cornered vote in the states outside the South is this:

	Pct
Stassen	44
Truman	42
Wallace	7
No opinion	7

Stassen Shows Surprising Strength in "Trial Heat" Against President Truman

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Mr. Stassen runs ahead of President Truman in the East and West Central sections, the latter including his home state. He ties with Truman in the East Central states, which include Ohio, where Mr. Stassen has announced he will oppose Robert A. Taft, Republican senator from that state, in the GOP primaries next May.

The "trial heat," first to be reported pitting Mr. Stassen against both the President and Mr. Wallace, shapes up this way in the five major geographical sections of the nation:

	Truman Pct	Stassen Pct	Wallace Pct	No opin. Pct
New Eng. & Mid. Atl.	40	44	7	9
East Cent.	43	43	5	9
West Cent.	41	50	5	4
South	74	19	2	5
Far West	44	40	11	5

It should be emphasized that in a "trial heat" of this kind the question is put to a representative cross-section of all voters, Democratic, Republican and Independent. Since party primaries in individual states are normally limited to regular party members, a candidate may not fare so well in a primary as he does in a "trial heat."

In institute surveys among Republican voters, Mr. Stassen lags behind Thomas E. Dewey as the choice for presidential nominee. That he then can turn around and run so well against President Truman results partially from the fact that he not only draws virtually all the regular

(CONTINUED ON PAGE 152)

Industrial Briefs . . .

• INCREASES PRODUCTION—The Warner Automotive Parts Div. of Borg-Warner Corp., Auburn, Ind., has started construction of a new addition to its plant to permit an increase in production of automotive replacement parts. The new structure is expected to be ready for operations in April.

• PORTAL SUIT ERASED—The $3 million portal to portal suit brought against the Allis-Chalmers Mfg. Co., Milwaukee, by local 248 of the CIO, was dismissed in federal court at Milwaukee.

• SALES REPRESENTATIVE — C. A. Waite Co., Pittsburgh, warehousing hot and cold-rolled steel bars has announced the appointment of John O'Connor as sales representative in western Pennsylvania, West Virginia and the eastern part of Ohio.

• ELECTS CHAIRMAN—The sign div. of the Porcelain Enamel Institute has elected Harold H. Wineburgh, president of Texlite, Inc., Dallas, chairman of the division.

• MERGER—The consolidation of the Whitney Chain & Mfg. Co. and the Hanson-Whitney Machine Co., both of Hartford, into Whitney-Hanson Industries, Inc., has been announced. Winthrop H. Whitney will serve as chairman of the board and Einar A. Hanson as president.

• ELECTRODE DISTRIBUTOR—The Wilson Welder & Metals Co., Inc., manufacturers of arc welding machines and electrodes, has appointed the Industrial Air Products Co. at 3200 N. W. Yeon Ave., Portland 10, as its exclusive electrode distributor in the state of Oregon.

• NEW PIPE FIRM — Keystone Pipe & Supply Co., 513 E. Traser St., Milwaukee, has been formed with C. W. Berger as president and J. P. Torpey, vice-president.

• SCRAP SALES AGENTS — New regional sales offices have been opened by the James Flett Organization, Chicago, national sales agents for industrial scrap. Hedley Thomas will head the Cincinnati office, located in the Union Trust Bldg. and Roger K. Taylor will head the St. Louis office in the Chemical Bldg.

• AWARDED FRITZ MEDAL—Dr. Theodore von Karman, aeronautical engineer, has been selected to receive the 1948 John Fritz Medal for scientific achievement presented by the American Society of Mechanical Engineers.

• UNDER NEW MANAGEMENT—New interests have taken over the Davies & Thomas Co. foundry in Catasauqua, Pa., and will operate under the name of Davies & Thomas, Inc. manufacturing tunnel segments and all sizes of gray iron castings. James T. Duffy, Jr. will be chairman of the board and treasurer and Norman Esibill, president.

• CHANGES NAME—The Crucible Steel Casting Co., Milwaukee, had its name changed to Crucible Steel Casting Corp., by an order signed by the Federal Judge in closing the old firm's bankruptcy proceedings and completing organization of the new firm.

• RELTOOL EXPANDS — Reltool Corp., 712 W. Michigan St., Milwaukee, has purchased 40 pct of the capital stock of the Pohl Tool Co., Detroit, which will be operated as an affiliate to increase Reltool's production of cutting tools for the machine trade.

• ACQUISITION — The Timken-Detroit Axle Co., Detroit, has acquired the Stoker Div. of the Link-Belt Co. of Chicago. Link-Belt Stoker Div. will continue to function under the supervision of the Timken Silent Automatic Div.

Alcan Says Research Largely Responsible For Expanding Uses

New York

• • • **The Aluminum Co.** of Canada should be feeling pretty good. Last year it produced 270,000 metric tons of aluminum, compared with only 64,000 tons in 1938, according to *The Alcan Ingot*. But there is a lot more to the story than this spotty comparison indicates.

Ten pct of last year's record-breaking sales volume of aluminum represented new uses for the metal. True, many of the new applications of aluminum were brought on by the tight supply of finished steel products. But that isn't worrying Alcan, who points to the research activities of the company as the most important factor in the ever-expanding applications of aluminum.

Next spring nine ships will set sail from Canada to go into service in China. The superstructures of these vessels are made of aluminum and represent the largest aluminum shipbuilding job ever undertaken, according to Alcan.

Research has also paid off in adapting aluminum to the many problems facing engineers in the manufacture of pulp and paper, an industry vital to the Canadian economy. Aluminum heat exchangers, ventilating ducts, flake driers, conduit, paper machine hoods, and rolls are a few specific items to which aluminum has been adapted.

As in the United States the building trade has also turned more and more to aluminum to solve its supply problems during the past year. Aluminum has gained widespread recognition as roofing sheet, especially in the rural markets. The popularity of aluminum windows increased greatly last year, and there are now five manufacturers supplying this product in Canada.

Alcan optimism stems largely from the fact that the historic pattern of costs in the industry is downward. They point out that the price of the aluminum ingot is 25 pct below that quoted in 1939.

Oxygen in Steelmaking, Minerals Share Convention Spotlight

Awards Presented at Annual Conclave of Mining and Metal Engineers

o o o

New York

• • • **World and domestic minerals** resources shared the spotlight with developments in the use of oxygen in steelmaking and other technological developments in steel and nonferrous metallurgy last week at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York. In addition to the usual technical sessions of the Iron and Steel and Institute of Metals divisions, there were sessions on Mineral Economics under the chairmanship of Elmer W. Pehrson and Charles H. Behre, Jr., and of the United States Section of the Pan-American Institute of Mining Engineering and Geology.

William Embry Wrather, director of the United States Geological Survey was inducted as AIME president for 1948 at the annual banquet on Wednesday. Mr. Wrather is a widely known petroleum geologist and in the past has served as institute director and as chairman of the institute's petroleum division.

The annual banquet was also the scene for the presentation of awards for outstanding achievements during the year. Eugene Gifford Grace received the Charles F. Rand gold medal for his distinguished leadership in the administration of all phases of a large and complex industrial enterprise; for profound influence on the growth and health of the American iron and steel industry. Mr. Grace is chairman of the board of the Bethlehem Steel Corp.

Wallace Everette Pratt received the Anthony F. Lucas medal for broad vision and leadership in evaluating for industry the application of geology, geophysics and engineering to finding, developing and producing petroleum. Until his recent retirement, Mr. Pratt was vice-president of the Standard Oil Co. of New Jersey.

Bernard M. Larsen and Theron E. Brower were awarded the Robert W. Hunt medal for their work on the use of oxygen in liquid openhearth steel. Mr. Larsen is supervisor of process metallurgy research for the U. S. Steel Corp. Mr. Brower is associate physical chemist for the same company.

Benjamin B. Frost received the J. E. Johnson, Jr., award for his work on the performance of large hot blast stoves. Mr. Frost is sales engineer for Arthur G. McKee and Co. He was active in Brazil at the time of the operation of the Volta Redonda plant of Brazilian National Steel Co.

John H. Holloman received the Alfred Noble prize for his work on the mechanical equation of state. Mr. Holloman is a research associate of the General Electric research laboratory in Schenectady.

E. Charles Patton, Jr. received the Rossiter W. Raymond memorial award for his work on the evaluation of pressure maintenance by internal gas injection in volumetrically controlled reservoirs. Mr. Patton is petroleum engineer for the Magnolia Petroleum Co. at Dallas.

John S. Smart, Jr. and Albert A.

WILLIAM E. WRATHER, director, U. S. Geological Survey, Washington, new president, AIME, 1948.

GILBERT SOLER, general superintendent, Atlas Steels Ltd., Welland, Ontario, new chairman, Iron & Steel Div.

A. A. SMITH, Jr., superintendent of research, American Smelting & Refining Co., Barber, N. J., new chairman, Institute of Metals.

Smith, Jr. received the Institute of Metals Division award for their work on the effect of phosphorus, arsenic, sulfur and selenium on properties of high purity copper. Mr. Smart is research metallurgist for American Smelting & Refining Co. at Barber, N. J. Mr. Smith is superintendent of the central research laboratories of the same company.

The Howe Memorial Lecture was delivered this year by Robert B. Sosman, formerly assistant director of the geophysical laboratory of the Carnegie Institute of Washington and assistant director of the research laboratories of the U. S. Steel Corp. He is now professor of ceramics at Rutgers University. His subject was temperatures in the openhearth furnace.

The Lecture of the Institute of Metals Division was presented by Cyril Stanley Smith on "Grains, Phases and Interfaces: An Explanation of Microstructure." Dr. Smith, research metallurgist for American Brass Co., Waterbury, Conn., was associated with the War Metallurgy Committee during the war and placed in charge of metallurgy for the atom bomb project at Los Alamos, N. M.

Attendance at the meeting, higher than any previous year, was estimated at 3000.

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• • • **The role played** by oxygen in the manufacture of steel assumed a prominent position on the Iron and Steel Div. calendar. Two papers, "Direct Oxidation in the Basic Openhearth Process," by E. B. Hughes and F. G. Norris, Wheeling Steel Corp., Steubenville, Ohio, and "Operation of Oxygen - Enriched Openhearth Furnaces," by J. S. Marsh, research engineer, Bethlehem Steel Co., Bethlehem, Pa., were delivered before a SRO audience, and aroused considerable discussion.

The paper by Marsh described experimental heats made with the oxygen being utilized in conjunction with openhearth burners. The data contained in this comprehensive report are considered to be of such interest that no attempt is made to review its contents herein. An extended summary will, however, be presented in a subsequent issue.

Oxygen as an aid in carbon reduction was the theme of the Hughes and Norris presentation, in which the authors refuted views expressed in the literature to the effect that (1) higher-grade refractories are needed, (2) oxygen must be cheaper in price, and (3) fumes and dust must be overcome, before direct oxidation can prove practical from a commercial point of view. Their report was intended to show that by selection of the proper stage of the heat for the direct oxidation* and amount of oxygen used, the process is economical from the standpoint of oxygen and refractories and without the production of undue fumes. The 160-ton furnaces used are built of the usual brick and with oxygen at a cost of $3.35 per 1000 cu ft.

**Direct oxidation refers to the reaction that results from introducing oxygen either alone or mixed with other gases directly into the steel bath.*

The usual furnace charge is 44 pct hot metal, 64 pct scrap and 2 pct cold iron comprised mainly of ladle skulls. Sintered ore is charged with the heat; the flux charge is 135 lb limestone per ton of ingots. Oxygen, of 99.5 pct purity, is introduced through ¾-in. standard pipe with a line pressure of 100 lb and about 75 lb at the discharge, resulting in a rate of flow of 500 cfm. The preferred depth of immersion is 6 to 10 in.; from 1 to 14 lengths (20 ft) of pipe are used per heat. Utilizing direct oxidation on all grades of 0.08 pct C and below, average oxygen consumption, for some 3900 heats, has amounted to 37 to 42 cu ft per ton steel tapped.

Supplementing their presentation with a discussion of some metallurgical considerations concerning the role played by oxygen in direct oxidation, the authors touched upon the chemical relation between carbon and oxygen, and upon carbon elimination, its determination and control. Computations of efficiency based on the cu ft of oxygen per point of carbon removed from the bath showed that this factor is dependent upon the carbon content of the bath at the start of oxidation. In oxidizing the carbon from 1.00 to 0.90 pct, the oxygen consumption per point of carbon per ton of bath is 1 to 2 cu ft; from 0.25 to 0.10 pct C the consumption is 3 to 3.5 cu ft; from 0.10 to 0.05 pct C it is about 15 cu ft; and below 0.05 it is 40 to 60 cu ft, the variation depending on the condition of the slag at start of oxidation.

An interesting observation was made to the effect that theoretically and actually it is possible to replace all feed ore with oxygen fed directly into the bath; in other words, to conduct a bessemer or pneumatic process in an openhearth furnace. To the extent that pig iron or ferrosilicon is used to increase the temperature near the end of the heat, it is possible to replace these materials with oxygen. This was substantiated with data indicating a decrease in ladle skull accompanying direct oxidation as compared with indirect oxidation.

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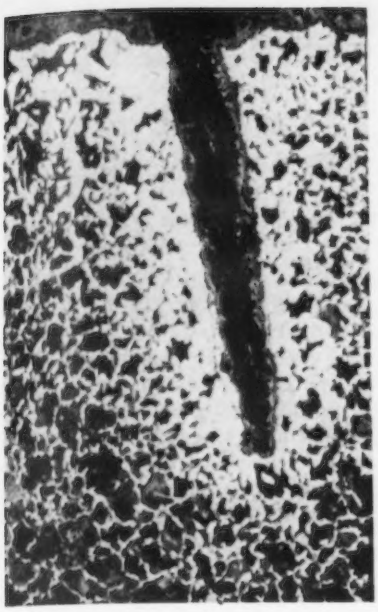
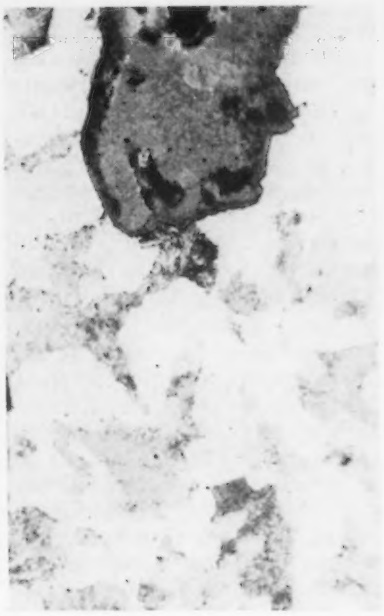
• • • **An interesting** procedure that would appear to be of commercial significance, at least potentially, was outlined by C. L. Meyette, supervisor of research, and V. E. Elliott, metallographist, Carnegie-Illinois Steel Corp., Gary, in their paper entitled "A Method for Determining the Origin of Surface Defects in Rolled Steel Products." The authors premised their study on the fact that inasmuch as the conditioning of semifinished steel products, such as billets, blooms, and slabs to remove surface defects before further processing to finished products is a necessary accompaniment to steelmill rolling operations, a knowledge of the kinds of defects that occur and of the conditions in melting, teeming, and rolling that may lead to their occurrence is favorable to the production of quality products.

Defects which existed in the ingot prior to rolling, classed as steel-type defects, are characterized by the penetration of oxide surrounding the flaw; defects which were formed in either the primary or secondary rolling operations, classed as mechanical type defects, do not show any appreciable penetration of oxide adjacent to the flaw.

The method was applied to ten grades of steel and representative illustrations were presented by the authors to show diffusion of oxide from scale-packed holes in billet samples, from the two kinds of defects as produced artificially in the laboratory. The



A



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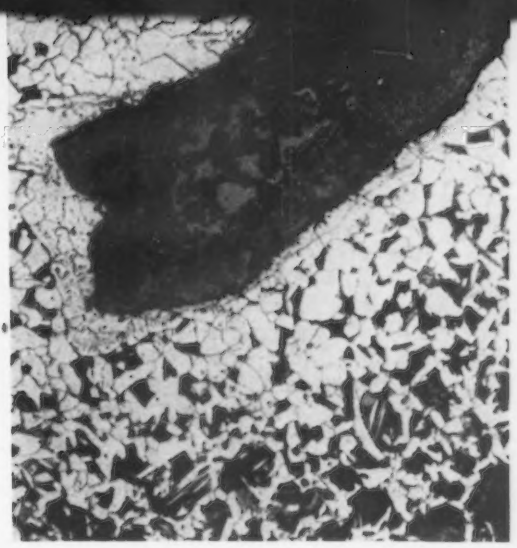
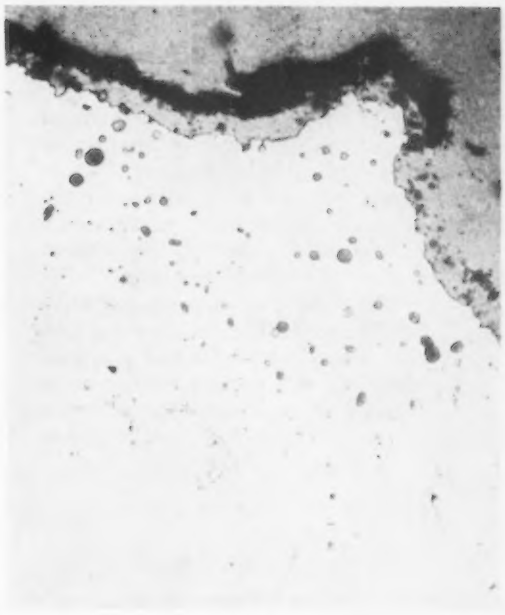


C



D

FIG. 1 (A, B, C, D) Photomicrographs showing the difference in degree of iron oxide penetration within mechanical type and steel type actual surface defects in two AISI grades of carbon steel. Samples etched in picral. Photos A and B indicate the mechanical type defect in rolled C-1060 steel at 60X and 500X, respectively; C and D indicate the steel type defect in rolled C-1055 steel at 100X and 500X, respectively.

method was found applicable to all but 18-8 stainless steel.

To illustrate the application of the method of examination to actual cases, a number of billet samples representing several grades of steel were obtained from material that had been set aside for surface conditioning. Where surface defects were found, sections containing them were cut from the billets, polished, etched, and examined under the microscope. A typical illustration of the results obtained is illustrated in fig. 1, which shows an observed defect in AISI C-1060 steel that, in the absence of penetrated oxide, may be classed as mechanical-type defects (photos A and B); and a defect in a grade of similar composition, AISI C-1055 steel in which the pronounced evidence of penetrated oxide places this in the class of a steel-type defect (photos C and D).

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A wide variety of metallurgical defects in steel have commonly been attributed to the presence of excessive amounts of hydrogen. These defects include flakes in rails and forgings, cracks in welds, and blisters in enameled ware. They have been related to hydrogen largely by circumstantial evidence because the proper sampling and analysis of steel for hydrogen has been known to be difficult and because no general agreement has existed with regard to the suitability and accuracy of available methods.

In their paper entitled "The Sampling and Analysis of Steel for Hydrogen," G. Derge and W. Peifer, Metals Research Laboratory, Carnegie Institute of Technology, and J. H. Richards, research assistant, Carnegie-Illinois Steel Corp., described various methods of sampling and analysis that have been developed, and illustrated the usefulness and limitations of these methods by citing applications to specific problems. They pointed out that when a standard vacuum fusion equipment for the analysis of gases in steel is modified so samples can be analyzed immediately after introduction to the vacuum, so that hydrogen blank corrections are small, and so the gas reservoirs and pressure measurements are adjusted to the small amounts of hydrogen which are present, it is possible to analyze steel for hydrogen with a probable error of ± 0.00001 pct. If the results of such analyses are to carry significance, it is necessary to give careful attention to all details related to the preparation of the samples.

The authors observed that the initial hydrogen content of a rolled rail is about 0.0003 pct, and that this decreases to a "residual" value of about 0.00003 pct in a period of about 30 days, after which there are no further observable changes. If the gas which escapes during this 30-day period is considered separately as the "diffusible hydrogen" and treated in accordance with diffusion theory, it is possible to extend a limited number of analyses so as to describe the changes in hydrogen content of any size or shape of specimen at any temperature below the critical. Data from rail steels have been shown to conform to this interpretation.

The authors also found that in any group of heats studied, those heats which flaked were also

higher than average in hydrogen in the as-rolled condition.

• • •

An interesting experiment concerning the preparation of "Nickel Steels by Powder Metallurgy" was reported by Laurence Delisle, Sylvania Electric Products, Bayside, N. Y., and Walter Knopp, research fellow, Stevens Institute of Technology, Hoboken, N. J. The study was carried on for the purpose of determining whether sufficient diffusion of nickel and other incidental metals normally present in nickel steels could be induced in the solid state to modify the properties of plain carbon steels made from powders and produce the beneficial effect of alloying.

Metal powders, in the proportion corresponding to an SAE 2330 composition, were mixed with graphite, pressed, and heated at different temperatures for different periods of time, to produce bonding of the metal particles and mutual diffusion of the various elements without melting.

The authors found that the diffusion of nickel and other elements takes place in the solid state to an extent sufficient to change the mechanical properties of the steel markedly as compared to those of plain carbon steel. A steel containing 3.5 Ni and 0.23 C, sintered at 2415°F, produced properties of 142,000 psi tensile strength and 3 pct elongation (after quenching in oil and tempering). For comparison, a plain carbon steel, having the same carbon content and prepared under the same conditions had a tensile strength of 69,000 psi and an elongation of 8.3 pct.

It was discovered, however, that diffusion of the metallic alloying elements was not complete under the conditions of the experiment, and that sintering at higher temperatures for longer periods of time would be required. Such conditions are not commercially practical, the authors felt, but held that diffusion could be accelerated by the use of finer or alloy powders. They went on to say that complete diffusion may not be necessary for all applications, and that it might be possible to take advantage of partial diffusion and control it to obtain a partially-hardened tough structure upon sintering without quenching. The microstructure of nickel steels so treated consists of a pearlitic matrix in which hard areas higher in nickel are distributed.

• • •

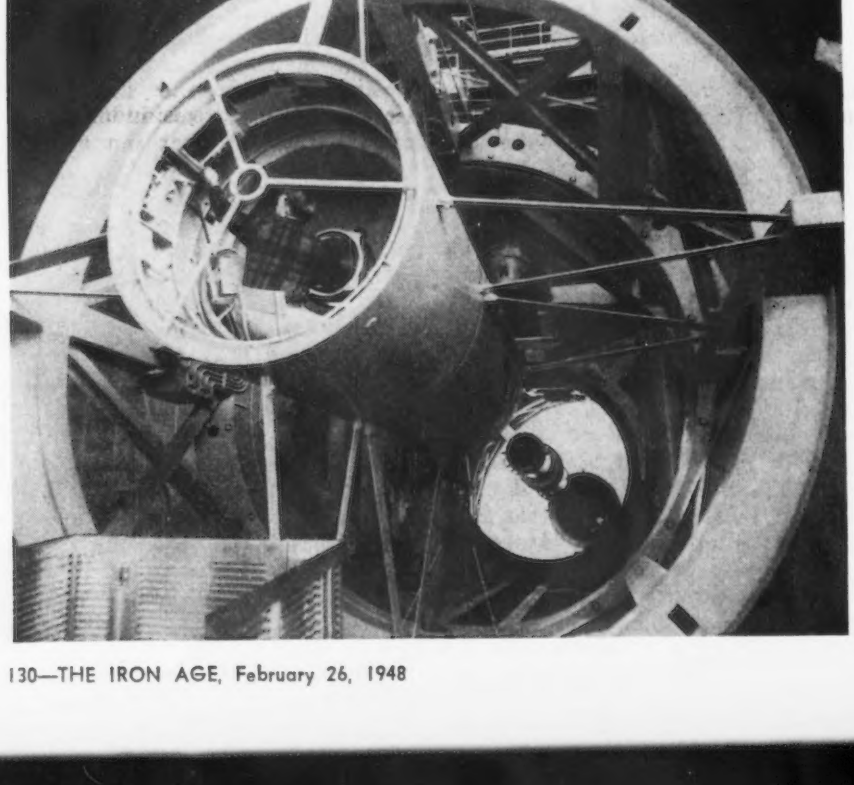
The use of ball, rod and tube mills for grinding ore, cement and other materials has expanded so greatly during the past 40 years that the world's annual consumption of ferrous grinding media for these mills is estimated to be from ½ million to 1 million tons, of which ferrous grinding balls constitute the major portion.

In their paper "Wear Tests on Grinding Balls," T. E. Norman, metallurgical engineer, and C. M. Loeb, Jr., vice-president, Climax Molybdenum Co., reported the development of a wear test capable of testing numerous types of balls within a relatively short time and with good correlation with actual large scale operations. The procedure outlined was successful in that it revealed the influences of various factors on the quality of grinding balls. It was definitely established, for example, that barring segregation, grinding balls wear in direct proportion to their surface area and, therefore, decrease in diameter at a constant rate.

Metallurgically, it was found that a matrix of martensite or low temperature bainite, plus retained austenite, gave the best wear resistance of all the types studied. Further, the presence of spheroidized carbides was found to enhance the wear resistance of a martensite matrix. Since a very large proportion of grinding balls used commercially are those with a pearlite structure the characteristics of such balls were investigated thoroughly. Results indicated that in grinding the softer types of abrasives, such as feldspar or calcite, none of the pearlitic steels or irons showed up well in comparison with the standard martensitic steel balls, although some of the harder, high carbon pearlitic steels were capable of giving a fairly good account of themselves.

The authors discovered that alloying elements have an indirect affect and their selection depends upon their ability to develop the desired matrix structure under the conditions of heat treatment selected by the manufacturer. The metalloids sulfur and phosphorus are undesirable constituents in all types of steel balls because they increase brittleness, impair the hot working properties of the steels, increase the tendency of a steel to quench crack, and decrease wear resistance.

MECHANICAL EYE: *Final and most exacting adjustments are nearing completion on the 200-in. telescope at Mt. Palomar (Calif.) Observatory. The camera and operator are shown in the tube mounted at the prime focus of the huge mirror whose glaring eye, reflects the image of the camera tube.*



Construction Steel . . .

• • • Fabricated steel awards this week included the following:

775 Tons, Philadelphia, apartment house, Pelham Park Apartments, to Bethlehem Steel Co., Bethlehem.

450 Tons, Consolidated Edison Co., Hunts Point plant, to Grand Iron Works, Inc., New York.

265 Tons, Des Moines, new furnace factory built by the Des Moines Chamber of Commerce to be leased to Armstrong Furnace Co. through Weitz Co. Inc., to Pittsburgh-Des Moines Steel Co.

150 Tons, Chicago, building for Binks Mfg. Co. to New City Iron Works.

• • • Fabricated steel inquiries this week included the following:

3000 Tons, Detroit, Mistersky power station for City of Detroit.

1800 Tons, State of New York, building for the Chicago Pneumatic Tool Co.

700 Tons, Lakeside County, Ill., bridge section TF-MFT for the State of Illinois, American Bridge Co., low bidder.

210 Tons, Pajaro, Calif., steel bridge, 11 miles east of Watsonville, California Div. of Highways, Sacramento, bids to Mar. 17.

• • • Reinforcing bar awards this week included the following:

1150 Tons, Evanston, Ill., city water works, through S-N-Nielson Co., to Bethlehem Steel Co., Bethlehem.

• • • Reinforcing bar inquiries this week included the following:

2200 Tons, Whiting, Ind., barrel house plant for the Standard Oil Co. of Indiana.

750 Tons, Oroville, Calif., main tunnel, surge tank and penstock tunnel, Rock Creek power plant, Pacific Gas & Electric Co., San Francisco, bids to Mar. 9.

Armed Force Buying Procedure Changes Take Effect in May

Washington

• • • Procurement by the armed forces, traditionally negotiated on a lowest-bid basis, will be subject to the provisions of a brand-new law, beginning about May 1.

Contracting officers for the Army, Navy, Air Force and Coast Guard are studying the newly-enacted Armed Services Procurement Act of 1947, which authorizes the awarding of contracts on the bases of "the best public interest" and "lower ultimate cost," rather than the pure clerical determination of lowest bid.

Legislation (H.R. 1366) authorizing the policy switch has the backing of the armed forces and of the Bureau of the Budget. It was signed into law by President Truman last week and becomes effective 90 days from enactment.

Actually, the armed forces, acting under temporary wartime authority, already have begun to write new procurement regulations based on provisions of the new and permanent statute. The new law is the result of almost two years of study by the Senate and House Armed Services Committees (THE IRON AGE, Feb. 14, 1946, p. 120).

Senator Byrd, D., Va., in reporting the bill to the Senate, declared his committee "convinced that there are a number of situations in which the exercise of judgment by the purchasing officer should not merely be permitted, but should be encouraged."

However, conventional advertising for bids will continue to be the basis for a great majority of the procurement carried on the armed forces. A minority of contracts — involving, for the most part, classified materials—will be negotiated directly, without resort to public advertising.

One important feature of the new law enables the armed forces to turn to negotiations when bids are believed by procurement officers to quote "unreasonably high" prices or to show evidence of collusion in bidding.

Such devices as collusive bidding, follow-the-leader pricing, rotated low bids, identical bids requiring the drawing of lots, uniform estimating systems, refusal to classify the government as other than a retail buyer regardless of quantity purchased will be outlawed under the new act, the Army and Navy feel.

Bids suspected of not being derived by open competition may be referred to the Attorney General for action, under the provisions of the act. Another proviso requires that negotiated prices be lower than the lowest one received from a responsible bidder as a result of advertising.

The House Armed Services Committee points out that the new law "pulls within the framework of one law almost a century's accumulation of statutes and incorporates new safeguards designed to eliminate abuses, assures the government of fair and reasonable prices for the supplies and services procured, and affords an equal opportunity to all suppliers to compete for and share in the government's business."

Coming Events

Feb. 28, March 1-2 American Metallizing Contractors Assn., meeting, Cleveland.

Mar. 1-4 American Society of Mechanical Engineers, meeting, New Orleans.

Mar. 3-5 Society of Automotive Engineers, national passenger car meeting, Detroit.

Mar. 15-19 ASTE Industrial Exposition, Cleveland.

Mar. 18-19 Magnesium Assn., annual meeting, New York.

Apr. 5-8 Southern Machinery and Metals Exposition, Atlanta.

Apr. 5-8 National Assn. of Corrosion Engineers, annual conference and exhibition, St. Louis.

Apr. 7-9 American Society of Civil Engineers, meeting, Pittsburgh.

Apr. 12-14 Openhearth Steel Committee and Coke Oven, Blast Furnace and Raw Materials Committee, AIME, annual conference, Pittsburgh.

Apr. 15-16 Metal Powder Assn., annual meeting and exhibit, Chicago.

Apr. 19-21 American Society of Lubrication Engineers, convention and exhibition, Buffalo.

Apr. 19-23 American Chemical Society, national meeting, Chicago.

Apr. 22-23 Westinghouse Electric Corp., Machine Tool Forum, Buffalo.

May 3-7 American Foundrymen's Assn., convention and show, Philadelphia.

May 20-21 Society of the Plastics Industry, annual meeting, Atlantic City, N. J.

May 26-27 American Iron & Steel Institute, meeting, New York (restricted to members only).

May 27-29 Society for Experimental Stress Analysis, meeting, Pittsburgh.

Material Shortages Strangle Efforts of Italian Steel Industry

New York

• • • **Like a punchy** prizefighter gamely trying to shake off the effects of a paralyzing blow to the midsection, the Italian steel industry is staging a determined, though wobbly, comeback. Like the prizefighter its task is made tremendously difficult because its foundation is not secure.

The basic foundation of any steel industry is dependent on large, readily available supplies of iron ore and coking coal. Italy has neither. She does have technical know-how, and a people with an enormous capacity for work.

Historically, the steel industry in Italy has taken full advantage of these latter two human factors. Artificial means have been used to provide the non-human raw-material factors. Most of the steel plants have long been located in the northern sections of the country, depending on imports for their raw materials.

Thus Italy has been in a poor position, from the standpoint of logistics, to compete with the lower-cost steel industries of Germany, France, Britain, Luxembourg and Belgium. In each of these countries at least one, and in most cases both, of the two basic raw materials are readily available.

But this did not deter Italy in its pursuit of an ever-increasing output of steel. Factors other than logistic or economic were hard at work. The pressure of nationalism made the cry for domestic steel production, to the point of self-sufficiency, a loud one.

Trade Agreements With France And England May Augment Supply of Materials

o o o

It is not surprising then that Mussolini decided in the thirties that the historic industry, born and nurtured midst frugality, would have to be supplanted with a spectacularly modern steel industry. Besides, he needed its output to equip his army. Out of his dreams grew the plan for a new government-financed steel industry.

Three large integrated plants were subsequently built on the west coast of Italy. Raw materials to supply them were imported.

During the war two of these plants were very severely bombed and mined, and the third was dismantled and moved out by the Germans. At the close of the war Italian government and industry were then faced with the decision as to whether reconstruction efforts should be centered on rebuilding the three large, integrated plants on the coast, or modernizing and expanding the smaller non-integrated plants mostly in the northern part of the country.

Sources close to the Italian industry say that a clear-cut and final decision has been reached to pursue the latter course. They point out that the withdrawal of government financing from business has been made a gradual one in order to prevent widespread unemployment.

But despite the fact that the U. S. government authorized a loan of $100 million for the reconstruction of Italian industry in the middle of last year, not a penny of it has been applied for by Italian industry. The Export-Import bank specified that the Italian government was to be left out of the deals, but that government has stymied every deal to date by trying to get an oar of control into it. If it could get clear of government interference, the Italian industry could use these dollar credits for badly needed modernization work.

The leftist elements in the country are not opposing the government exodus from business with any appreciable vigor. It is believed by some that their failure to resist is based on a conviction that the government-financed steel plants represented an unending drain on the economy, causing public opinion to oppose government in industry.

As one observer, recently returned from viewing industry in Italy, pointed out, "Politicians, government and a great many of the people are of the opinion that it was a mistake for the government to finance the large integrated plants, requisites for which had to be artificially created, and which the natural resources and geography of the country do not merit."

This is the type of thinking which is causing Italy to return to a system of private financing and management of its steel industry, which means new hope for the small, nonintegrated plants.

The decline in the output of pig iron since August 1947 has had the

Italian Production of Pig Iron and Steel (Official)

		PIG IRON	STEEL		
Month	Year	Total Tons	Openhearth	Electric	Total Tons
January	1946	3,135	30,372	23,478	53,850
February	"	1,710	32,947	23,238	56,185
March	"	1,808	32,817	34,402	67,219
April	"	9,517	36,918	44,698	81,616
May	"	15,767	39,608	56,828	96,436
June	"	20,628	38,123	63,440	101,563
July	"	28,998	43,874	69,767	113,641
August	"	26,562	46,401	65,060	111,461
September	"	29,574	55,866	70,272	126,138
October	"	16,260	67,890	68,214	134,104
November	"	9,853	64,251	39,969	104,220
December	"	11,006	66,427	34,267	100,694
January	1947	13,627	74,456	17,829	92,285
February	"	13,570	64,630	16,176	80,806
March	"	15,662	80,490	36,931	117,421
April	"	24,508	82,854	70,452	153,306
May	"	40,971	86,211	79,750	166,358
June	"	40,470	83,294	75,622	159,241
July	"	39,867	90,848	79,263	170,275
August	"	36,667	83,169	71,191	154,488
September	"	25,089	83,154	63 594	146,897
October	"	27,778	104,013	58,913	162,962
November	"	22,317	99,531	54,995	154,543

expected adverse affect on steel production. However, important purchases of pig iron in Austria and in Czechoslovakia, in addition to that imported from the United States, have helped to offset this.

At present there are in operation two blast furnaces at Bagnoli (Naples), and two at Cogne (Aosta). Efficient operation of other iron and steel plants hinges on the amount of material assistance which can be obtained from foreign sources.

Considerable optimism is accompanying the announcement that the long - projected Italo - French Custom Union has finally been officially authorized. Although the exact terms of the agreement have not been completed; it is known that one of the major points of negotiation was for French sources to supply some of the raw material requirements of the Italian iron and steel industry.

The new trade agreement recently concluded between London and Rome is also expected to provide some assistance to the industry. But the Italians should not rely too much on raw-material assistance from France and Britain, since these countries are themselves in short supply of the very items Italy needs most.

Prospects for steel demand by consumers are contrasting. Owing to an excess of cars and trucks on the Italian market the automobile industry is not likely to increase its activity during 1948. Moreover, Italian shipbuilders are no longer considering the possibility of building for foreign markets. Reason given is that such orders leave too small a profit due to the "high cost" of Italian labor.

On the other hand, it has been confirmed that Italian manufacturers of pipe have contracted for delivery of $59 million worth of pipe to the Caltex for its oil fittings in the Middle East (Last year the Dalmine steel works supplied pipe to the Argentine State Oil Dept. and to the Royal Dutch Shell for its Indonesian oil plants, in what could be described as an international conversion deal).

The Italian steel industry has taken full advantage of existing facilities for electric power in the country, and it is the electric furnaces which have made the best progress since the war. Future progress of these plants can be predicted only insofar as one can predict the availability of scrap and pig iron supplies, which continue to be extremely tight.

On one point at least there is unanimity of opinion among those who have observed the wobbly efforts of the Italian steel industry to stage a comeback. All agree that the Italian people have displayed an inordinate and tenacious capacity for work. If the ordeal of survival for their steel industry depended solely on the toil of human hands, it would be a cinch. As it is, their future success will probably be measured by the raw materials they are able to obtain.

Foote-Burt Reports Profit

Cleveland

• • • **Net profit of** Foote-Burt Co. last year rose to $285,931, equal to $3.03 a share on outstanding stock, from $201,390, or $2.14 a share, in 1946, according to the company's annual report.

Regular Dividend Voted

Portsmouth, Ohio

• • • **Directors of** Portsmouth Steel Corp., Feb. 17 voted the regular semi-annual dividend of 25¢ per share, payable Mar. 1 to stock of record Feb. 23.

50 YEARS AGO

THE IRON AGE, *February 24, 1898*

• "The business community generally suspends judgment relative to the 'Maine' disaster but at the same time the more prudent are moving cautiously so far as any new ventures are concerned. It is stated, for instance, that the bankers who are to underwrite the wire consolidation are now of the opinion that the near future may not be a particularly auspicious time for launching the new company."

• **"It is reported that the third rail electrical system adopted last year by the New England road near Hartford worked admirably during the recent severe snow. There was found to be no leakage of current and no interruption of service."**
(Long Island RR take note.—Ed.)

• "The destruction last week of another so-called 'fire proof' business structure in New York affords an additional illustration of the practical impossibility of checking a fire when it attacks the upper floors of a modern sky scraper. Since business buildings now have towered to a height of over six stories the difficulty of providing adequate fire protection has become almost insuperable."

• **"A tube joint adapted to bicycle frames and which obviates the disadvantages arising from brazing has been designed by Charles T. Crowden. With the new joining method each tube is expanded into its corresponding fitting, and not only are the separate pieces brought into intimate contact all over, but the tube is actually forced into grooves in the fitting so that the two are locked together."**

• "The increasing use of iron and steel in all kinds of construction is having a perceptible effect on the carpenter. Almost everything requiring joining is now made by machinery in a factory and the carpenter is merely a fitter with a limited kit of tools. In modern buildings of steel construction he plays a very modest part as compared with his conspicuous position as a craftsman in the vanishing wooden age."

• **"A judicial interpretation of the word 'accident' in relation to a life insurance policy, rendered by the U. S. Court of Appeals at St. Louis shows that it applies to death due to tight shoes."**

The Iron Age Metalworking Buyers' Guide

. . . A ninth section of the Buyers' Guide is presented herewith. Previous sections have appeared weekly starting with the Annual Review Issue, Jan. 1, 1948, p. 208. This guide has been developed to give executives and purchasing agents of the metal working industry a directory with a much finer breakdown in classifications than has been heretofore available. Additional sections of the guide will be published weekly.

C

(CONTINUED)

CONTINENTAL TOOL WORKS, DIV. OF EX-CELL-O CORP., Detroit 6.

GREENFIELD TAP & DIE CO., Greenfield, Mass.

Millersburg Reamer & Tool Co., Millersburg, Pa.

THREADWELL TAP & DIE CO., Greenfield, Mass.

Counterbores, Solid and Interchangeable

EX-CELL-O CORP., 1210 Oakman Blvd., Detroit.

GREENFIELD TAP & DIE CO., Greenfield, Mass.

MORSE TWIST DRILL & MACHINE CO., New Bedford, Mass.

National Twist Drill & Tool Co., Rochester, Mich.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., W. Hartford 1, Conn.

STANDARD TOOL CO., 6909 Central Ave., Cleveland.

Vascoloy-Ramet Corp., North Chicago, Ill.

WHITMAN & BARNES, DIV. OF UNITED DRILL & TOOL CORP., Detroit 16.

Counterboring Machines

MOLINE TOOL CO., 100 Twentieth St., Moline, Ill.

Counters, Industrial

Du Mont, Allen B., Laboratories, Inc., Main St., Passaic, N. J.

Durant Manufacturing Co., 1915 N. Buffum St., Milwaukee 1.

VEEDER-ROOT, INC., 20 Sargent St., Hartford 2.

Countersinks

CHICAGO LATROBE TWIST DRILL WKS., 411 W. Ontario St., Chicago 10.

CLEVELAND TWIST DRILL CO., 1242 E. 49th St., Cleveland 14.

FARNHAM MANUFACTURING CO., 1646-54 Seneca St., Buffalo 10.

WHITMAN & BARNES, DIV. OF UNITED DRILL & TOOL CORP., Detroit 16.

Couplings

AJAX FLEXIBLE COUPLING CO., 538 Welsh Bldg., Westfield, N. Y.

Brownstein Mfg. Co., Ellwood City, Pa.

LOVEJOY FLEXIBLE COUPLING CO., 5066 W. Lake Street, Chicago 44.

MORSE CHAIN CO., Ithaca, N. Y.

PHILADELPHIA GEAR WORKS, INC., Erie Ave. & G Street, Philadelphia 34.

PITTSBURGH GEAR & MACHINE CO., Smallman & 27th Sts., Pittsburgh 22.

POOLE FOUNDRY & MACHINE CO., 3701 Clipper Mill Rd., Baltimore 11, Md.

Ramsey Chain Co., Inc., Troy Rd., Albany 1.

THOMAS FLEXIBLE COUPLING CO., Warren, Pa.

TWIN-DISC CLUTCH CO., Racine, Wisc.

Couplings, Flexible

AMERICAN FLEXIBLE COUPLING CO., 18th & Pittsburgh Aves., Erie, Pa.

Cullman Wheel Co., 1344 Altgeld St., Chicago 14.

Diamond Chain Co., Inc., 502 Kentucky Ave., Indianapolis 7.

Falk Corp., Milwaukee.

FARREL-BIRMINGHAM CO., INC., Ansonia, Conn. & 344 Vulcan St., Buffalo 7, N. Y.

LOVEJOY FLEXIBLE COUPLING CO., 5066 W. Lake Street, Chicago 44.

Thomas Flexible Coupling Co., Warren, Pa.

Couplings, Hose

Aeroquip Corp., East Ave., Jackson, Mich.

Hansen Mfg. Co., 1786 East 27th St., Cleveland 14.

Heckethorn Mfg. & Supply Co., Littleton, Colo.

Crane Lifters

CULLEN-FRIESTEDT CO., 1300 So. Kilbourn Ave., Chicago 23.

HEPPENSTALL CO., 46th & A.V.R.R., Pittsburgh 1.

MERRILL BROS., 56-22 Arnold St., Maspeth, L. I., N. Y.

RENFORE, J. C., & SONS, 1259 West State Street, Jacksonville 1, Fla.

Cranes

ALLIANCE MACHINE CO., Alliance, Ohio.

AMERICAN MONORAIL CO., 13107 Athens Ave., Cleveland 7.

BROWNING, VICTOR R., & CO., INC., 26 Pelton Rd., Willoughby, Ohio.

Browning Crane & Shovel Co., 162nd & Waterloo Rd., N. E., Cleveland 10.

CLEVELAND TRAMRAIL DIV., CLEVELAND CRANE ENGINEERING CO., 4813 E. 281st St., Wickliffe, Ohio.

Conco Engineering Works, 24 Jefferson St., Mendola, Ill.

Cullen-Friestedt Co., 1300 So. Kilbourn Ave., Chicago 23.

EUCLID CRANE & HOIST CO., 1361 Chardon Rd., Euclid, Ohio.

FEEDRAIL CORP., 125 Barclay St., New York 7.

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

HUGHES-KEENAN CO., 571 Newman St., Mansfield, Ohio.

INDUSTRIAL BROWNHOIST CORP., Bay City, Mich.

INDUSTRIAL EQUIPMENT CO., Los Angeles, Calif.

MERCURY MFG. CO., 4118 South Halsted St., Chicago 9.

MICHIGAN BOWER SHOVEL CO., Benton Harbor, Mich.

MIXERMOBILE MFRS., 6855 N. E. Halsey St., Portland 16, Oregon.

NORTHERN ENGINEERING WORKS, 2625 Atwater Street, Detroit 7.

OHIO LOCOMOTIVE CRANE CO., Hopley Ave., Bucyrus, Ohio.

ORTON CRANE & SHOVEL CO., 608 So. Dearborn St., Chicago 5.

OSGOOD CO., GENERAL EXCAVATOR CO., Marion, Ohio.

SHEPARD-NILES CRANE & HOIST CORP., 356 Schuyler Ave., Montour Falls, N. Y.

SILENT HOIST & CRANE CO., 851 63rd St., Brooklyn 20.

UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14.

Cranes, Crawler Mounted

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

HUGHES KEENAN CO., 571 Newman St., Mansfield, Ohio.

OSGOOD CO., GENERAL EXCAVATOR CO., Marion, Ohio.

Thew Shovel Co., Lorain, Ohio.

Trackson Company, 3333 S. Chase Ave., Milwaukee 7.

Cranes, Cupola Charging

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

Louden Machinery Co., 1125 Broadway, Fairfield, Iowa.

Manning, Maxwell & Moore, Inc., 420 Broadway, Muskegon, Mich.

MORGAN ENGINEERING CO., Broadway, Alliance, Ohio.

Robbins & Myers, Inc., Clark Blvd., Springfield, Ohio.

SHEPARD NILES CRANE & HOIST CORP., 356 Schuyler Ave., Montour Falls, N. Y.

WHITING CORP., Lathrop Ave., Harvey, Ill.

Cranes, Electric, Overhead Traveling

AMERICAN MONORAIL CO., 13107 Athens Ave., Cleveland 7.

EUCLID CRANE & HOIST CO., 1361 Chardon Rd., Euclid, Ohio.

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

Louden Machinery Co., Fairfield, Iowa.

Modern Equipment Co., Port Washington, Wis.

Northern Engineering Works, 2625 Atwater St., Detroit 7.

Roeper Crane & Hoist Works, Inc., Moss & 10th Sts., Reading, Pa.

SHEPARD NILES CRANE & HOIST CORP., 356 Schuyler Ave., Montour Falls, N. Y.

WHITING CORP., Harvey, Ill.

Cranes, Excavating (See Excavating Machines, Cranes)

Cranes, Gantry

EUCLID CRANE & HOIST CO., 1361 Chardon Rd., Euclid, Ohio.

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

SHEPARD NILES CRANE & HOIST CORP., 356 Schuyler Ave., Montour Falls, N. Y.

WHITING CORP., Harvey, Ill.

Cranes, Hand

AMERICAN MONORAIL CO., 13107 Athens Ave., Cleveland 7.

EUCLID CRANE & HOIST CO., 1361 Chardon Rd., Euclid, Ohio.

Harrington Co., 17th & Callowhill Sts., Philadelphia 30.

SHEPARD NILES CRANE & HOIST CORP., 356 Schuyler Ave., Montour Falls, N. Y.

Wright Mfg. Division of American Chain & Cable Co. Inc., York, Pa.

Cranes, Industrial

American Hoist & Derrick Co., 63 South Robert St., St. Paul 1.

BAKER INDUSTRIAL TRUCK DIV., THE BAKER-RAULANG CO., 2175 West 25th St., Cleveland 13.

HILL ACME CO., 4533 St. Clair Ave., Cleveland 2.

Louden Machinery Co., Fairfield, Iowa.

SHEPARD NILES CRANE & HOIST CORP., 356 Schuyler Ave., Montour Falls, N. Y.

Thew Shovel Co, Lorain, Ohio.

Crankshaft Forgings

American Forge Div., American Brake Shoe Co., 330 S. Michigan Ave., Chicago.

ATLAS DROP FORGE CO., Mt. Hope Ave., Lansing, Mich.

BETHLEHEM STEEL CO., Bethlehem, Pa.

Champion Machine & Forging Co., 3750 E. 78th St., Cleveland.

Consolidated Steel Corp., P. O. Box 1348, Los Angeles.

MESTA MACHINE CO., P. O. Box 1466, Pittsburgh.

OHIO CRANKSHAFT CO., Dept. A-1, 3800 Harvard Ave., Cleveland 1.

ROCKFORD DROP FORGE CO., 2030 9th St., Rockford, Ill.

Crucibles

Electric Refractories & Alloys Corp., Vars Bldg., 344 Delaware Ave., Buffalo 2.

ELWELL-PARKER ELECTRIC CO., 4225 St. Clair Ave., Cleveland 14.

HARNISCHFEGER CORP., 4421 W. National Ave., Milwaukee 14.

Lava Crucible Co. of Pittsburgh, 627 Wabash Bldg., Pittsburgh 22.

NATIONAL CARBON CO., Inc., 30 E. 42nd St., New York 17.

SAUNDERS, ALEXANDER, & CO., 95 Bedford Street, New York 14.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Crushing Equipment, Jaw

ALLIS-CHALMERS MFG. CO., Ristow St., Milwaukee 1.

AMERICAN PULVERIZER CO., 1439 Macklind Ave., St. Louis 10.

Austin-Western Co., Barrows St., Aurora, Ill.

BIRDSBORO STEEL FOUNDRY & MACHINE CO., Furnace St., Birdsboro, Pa.

Bonnot Co., 722 Mulberry Rd. S. E., Canton 2, Ohio.

Consolidated Steel Corp., P. O. Box 1348, Los Angeles.

Eimco Corp., Salt Lake City.

JEFFREY MFG. CO., 925-99 N. 4th St., Columbus, Ohio.

Pioneering Engineering Works, Central Ave., Minneapolis.

Cupolas, Foundry

Dover Boiler & Plate Fabricators, Ogden Ave., Jersey City, N. J.

Green, A. P., Fire Brick Co., Breckenridge St., Mexico, Mo.

MEDART CO., 3500 De Kalb St., St. Louis.

TABOR MFG. CO., 6229 Tacony Rd., Philadelphia.

WHITING CORP., Harvey, Ill.

Cut-Off Blades

CLEVELAND TWIST DRILL CO., 1246 E. 49th St., Cleveland 14.

DO-ALL CO., Minneapolis, Minn.

Cutting-Off Machines

Aaron Machinery Co., Inc., 45 Crosby St., New York 12.

American Chain & Cable Co., Bridgeport, Conn.

ARMSTRONG-BLUM MFG. CO., 5700 Bloomingdale Ave., Chicago 39.

BARDONS & OLIVER, INC., 1133 W. 9th St., Cleveland 13.

Beals, McCarthy & Rogers, Inc. (Distributors), 50 Terrace St., Buffalo 5.

BERTSCH & CO., Cambridge City, Ind.

• Every company in the metalworking industry is urged to check this section of the new IRON AGE Metalworking Buyers' Guide, and send in corrections and additions to assure complete accuracy in the first reprint of the directory. Forward corrections to THE IRON AGE, Attention Buyers' Directory, 100 E. 42nd St. New York 17.

Bignall & Keeler Machine Co., Moorman St., Edwardsville, Ill.

Boice-Crane Co., Central Ave., Toledo, Ohio.

BOTWINIK BROS. OF MASS., INC. (Distributors), 5 Sherman St., Worcester 1, Mass.

Bridgeport Safety Emery Wheel Co., 1291 W. Broad St., Bridgeport, Conn.

BROWN & SHARPE MFG CO., 231 Prominade St., Providence.

Catskill Metal Works, Catskill, N. Y.

CLEVELAND PUNCH & SHEAR WORKS, 3929 St. Clair Ave., N. E., Cleveland 14.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

COCHRANE-BLY CO., Rochester, N. Y.

CONSOLIDATED MACHINE TOOL CORP., 565 Blossom Rd., Rochester, N. Y.

CONTINENTAL FOUNDRY & MACHINE CO., Grant Bldg., Pittsburgh 19.

Continental Machines, Inc., Minneapolis.

COX & SONS CO., Bridgeton, N. J.

Delta Mfg. Co., Stuckeman Ave., Milwaukee.

De Sanno, A.P., & Sons, Inc., Phoenixville, Pa.

ESPEN LUCAS MACHINE WORKS, 33 Girard Ave., Philadelphia.

General Machinery & Equipment Co., (Distributor), 180 S. 15th St., Harrisburg, Pa.

Grob Bros., Grafton, Wis.

HARNISCHFEGER CORP., 440 W. National Ave., Milwaukee 14.

Heller Machine Co., 114 Liberty St., New York 6.

Illinois Tool Works, 2515 N. Keeler Ave., Chicago.

Interstate Machinery Co., 1435 W. Pershing Rd., Chicago 9.

Kalamazoo Tank & Silo Co., Kalamazoo, Mich.

KANE & ROACH, INC., Syracuse, N. Y.

Laidlaw, William, Inc., Peoria, Ill.

LANDIS MACHINE CO., Waynesboro, Pa.

Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.

Modern Machine Tool Co., Water St., Jackson, Mich.

MOTCH & MERRYWEATHER MACHINERY CO., (Distributors), Penton Building, Cleveland.

Oliver Machinery Co., 1025 Clancy St., Grand Rapids 2, Mich.

Peerless Machine Co., Racine, Wis.

Porter McLeod Machine Tool Co., Hatfield, Mass.

Producto Machine Co., 1004 Housatonic Ave., Bridgeport, Conn.

Racine Tool & Machine Co., 1743 State St., Racine, Wis.

Rasmussen Machine Co., Westboro, Mass.

Ritterbush & Co., Inc., 50 Church St., New York 7.

Robertson Machine & Foundry, Buffalo, N. Y.

Royersford Foundry, 51 Deisher St., Royersford, Pa.

Scherr, George, Co., Inc., 418 Broome St., New York 12.

Simmons Machine Tool Corp., Albany 1, N. Y.

Stamets, William K., Jenkens Arcade Bldg., Pittsburgh.

TABOR MFG. CO., 6225 Tacony Road, Philadelphia.

Tannewitz Works, Grand Rapids, Mich.

Taylor-Wilson Mfg. Co., Thomson Ave., McKees Rocks, Pa.

UNITED STATES STEEL SUPPLY CO., (distributor), 1319 Wabansia Ave., Chicago 90.

WALKER TURNER CO., INC., E. 5th St., Plainfield, N. J.

WATERBURY-FARREL FOUNDRY MACH. CO., 453 Bank St., Waterbury 86, Conn.

Cutting, Sawing, and Filing Machines (See Cutting-Off Machines)

Cut-Off Wheels

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Beals, McCarthy & Rogers, Inc. (Distributor) 50 Terrace, Buffalo 5.

Mid-West Abrasive Co., 500 S. Washington St., Owosso, Mich.

NORTON CO., Worcester, Mass.

SIMONDS ABRASIVE CO., Tacony & Fraley Sts., Philadelphia 37.

U. S. Grinding Wheel Co., 180 Lafayette St., New York 13.

UNITED STATES STEEL SUPPLY CO., (Distributor), 1319 Wabansia Ave., Chicago 90.

Westfield Grinding Wheel Co., Westfield, Mass.

Cutters, Carbide Tipped (See Tools, Carbide Tipped)

Cutters, Die Sinking

American Cutter & Engineering Co., Baner St., Warren, Mich.

Gorton, George, Machine Co., 13th St., Racine, Wis.

Melin Tool Co., Inc., 1331 Phillips, S.W., Grand Rapids 7, Mich.

Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.

Severence Tool Industries, Inc., Iowa Ave., Saginaw, Mich.

Cutters, Milling (See Milling Cutters)

Cutters, Tube Cleaner

Airtool Mfg. Co., Center St., Springfield, Ohio.

BROWN & SHARPE MFG. CO., Providence, R. I.

Pittsburgh Pipe Cleaner Co., Melwood St., Pitsburgh 13.

Vincent Steel Process Co., 2424 Bellevue Ave., Detroit 7.

Cutting Alloys, Cast

ALLEGHENY LUDLUM STEEL CORP., Brackenridge, Pa.

JESSOP STEEL CO., Washington, Pa.

Cutting Machines, Oxyacetylene

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17.

Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 4.

Beals, McCarthy & Rogers, Inc. (Distributor), 50 Terrace, Buffalo 5.

General Welding & Equipment Co., 268 Northampton St., Boston 18.

HARNISCHFEGER CORP., 4401 W. National Ave., Milwaukee 14.

Indianapolis Machinery & Supply Co., (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

LINDE AIR PRODUCTS CO., 30 E. 42nd St., New York 17.

MODERN ENGINEERING CO., 3405 Pine Blvd., St. Louis 3.

NATIONAL CYLINDER GAS CO., 840 N. Michigan Ave., Chicago 11.

Rall Supply Co., 110 E. 42nd St., New York 17.

Universal Power Corp., 769 Carnegie Ave., Cleveland 15.

Cutting Oils

Alox Corp., 3943 Buffalo Ave., Niagara Falls, N. Y.

GULF OIL CORP., Gulf Refining Co., Box 1166, Pittsburgh 30.

HOUGHTON, E. F., & CO., 303 W. Lehigh Ave., Philadelphia 33.

Lubriplate Div., Fiske Bros. Refining Co., Toledo.

OAKITE PRODUCTS, INC., 22 Thames St., New York 6.

Oster Mfg. Co., 2038 E. 61st Pl., Cleveland 3.

Pure Oil Co., 35 E. Wacker Dr., Chicago 1.

Quaker Chemical Products Corp., Conshohocken, Pa.

Sinclair Refining Co., 630 Fifth Ave., New York 20.

SOCONY-VACUUM OIL CO., 26 Broadway, Rm. 1232, New York 4.

STANDARD OIL CO. OF INDIANA, 910 S. Michigan Ave., Chicago 80.

STUART, D. A., OIL CO., 2727 S. Troy St., Chicago 23.

SUN OIL CO., Walnut & 17th Sts., Philadelphia 3.

TEXAS CO., 405 Lexington Ave., New York 17.

TIDE WATER ASSOCIATED OIL CO., 17 Battery Pl., New York 4.

United Industrial Products, Inc., Div. of Adam Cook's Sons, Inc., Linden, N. J.

Cutting Oils, Additives

Bakelite Corp., 300 Madison Ave., New York 17.

Cutting Oils, Soluble

Alox Corp., 3943 Buffalo Ave., Niagara Falls, N. Y.

Beals, McCarthy & Rogers, Inc. (Distributor), 50 Terrace, Buffalo 5.

CINCINNATI MILLING & GRINDING MACHINES, INC., Cincinnati 9.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

DOALL CO., Minneapolis, Minn.

Filmite Oil Corp., 12733 W. Arden Place, Milwaukee 10.

GULF OIL CORP., GULF REFINING CO., P. O. Box 1166, Pittsburgh 30.

Keystone Lubricating Co., 21st, Clearfield & Lippincott Sts., Philadelphia 32.

Lubriplate Div., Fiske Brothers Refining Co., Newark, N. J.-Toledo.

National Refining Co., Hanna Bldg., Cleveland 15.

Pure Oil Co., 35 E. Wacker Dr., Chicago 1.

Quaker Chemical Products Corp., Conshohocken, Pa.

Sinclair Refining Co., 630 Fifth Ave., New York 20.

SOCONY VACUUM OIL CO., INC., 26 Broadway, New York 4.

STUART, D. A., OIL CO., LTD., 2737 S. Troy St., Chicago 23.

SUN OIL CO., Walnut & 17th St., Philadelphia 3.

TIDE WATER ASSOCIATED OIL CO., 17 Battery Pl., New York 4.

Cutting Oils, Sulfurized

Beals, McCarthy & Rogers, Inc. (Distributor), 50 Terrace, Buffalo 5.

Filmite Oil Corp., 12733 W. Arden Place, Milwaukee 10.

GULF OIL CORP., GULF REFINING CO., P. O. Box 1166, Pitsburgh 30.

Keystone Lubricating Co., 21st, Clearfield & Lippincott Sts., Philadelphia 32.

Lubriplate Div., Fiske Brothers Refining Co., Newark, N. J.-Toledo.

National Refining Co., Hanna Bldg., Cleveland 15.

Oster Manufacturing Co., 2038 E. 61st Pl., Cleveland 3.

Pure Oil Co., 35 E. Wacker Dr., Chicago 1.

Quaker Chemical Products Corp., Conshohocken, Pa.

Sinclair Refining Co., 630 Fifth Ave., New York 30.

SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4.

STUART, D. A., OIL CO., LTD., 2737 S. Troy St., Chicago 23.

SUN OIL CO., Walnut & 17th Sts., Philadelphia 3.

TIDE WATER ASSOCIATED OIL CO., 17 Battery Pl., New York 4.

Cutting Tools (See also Specific Types)

ALLOY TOOL & STEEL CO., INC., Hartford, Conn.

AMERICAN SHEAR KNIFE CO., Ann St., Homestead, Pa.

ARMSTRONG-BLUM MFG. CO., 5700 Bloomingdale Ave., Chicago 39.

ARMSTRONG BROS. TOOL CO., 5209 W. Armstrong Ave., Chicago 30.

ATKINS, E. C., & CO., 402 S. Illinois St., Indianapolis 9, Ind.

BOKUM TOOL CO., 14775 Wiedamere St., Detroit 21.

BROWN & SHARPE MFG. CO., 235 Promenade St., Providence, R. I.

CARBOLOY CO., INC., 11153 E. 8 Mile Blvd., Detroit 32.

CLEMSON BROS., INC., Middletown, N. Y.

CLEVELAND STEEL TOOL CO., 660 E. 82nd St., Cleveland 8.

CLEVELAND TWIST DRILL CO., 1246 E. 49th St., Cleveland 14.

CONTINENTAL TOOL WORKS DIV., EXCELL-O CORP., 1200 Oakman Blvd., Detroit 6.

COWLES TOOL CO., 2086 110th St., Cleveland 2.

DUMONT CORP., Greenfield, Mass.

EASTERN MACHINE SCREW CORP., 41 Barclay St., New Haven 6, Conn.

ELECTROLIZED TAP CORP., 148 W. River St., Providence 1, R. I.

FIRTH-STERLING STEEL CORP., McKeesport, Pa.

GAIRING TOOL CO., Box 478, Roosevelt Park Annex, Detroit 32.

GREENFIELD TAP & DIE CORP., Greenfield, Mass.

JONES & LAMSON MACHINE CORP., Springfield, Vt.

KENNAMETAL, INC., 1 Lloyd Ave., Latrobe, Pa.

KLING BROS. ENGINEERING WORKS, 1324 N. Kester Ave., Chicago 51.

KOEBEL DIAMOND TOOL CO., 9456 Grinnell Ave., Detroit 13.

LANDIS MACHINE CO., Church & 5th St., Waynesboro, Pa.

LEWTHWAITE, T. H., MACHINE CO., INC., 308 E. 47th St., New York 17.

MERCHANT, GEO. F., CO., 1420 Rockwell St., Chicago 8.

METAL CARBIDES CORP., 103 E. Indiana Ave., Youngstown 5, Ohio.

Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12.

MORSE TWIST DRILL & MACHINE CO., 163 Pleasant St., New Bedford, Mass.

MOTCH & MERRYWEATHER MACHINERY CO., Penton Bldg., Cleveland 13.

MURCHEY MACHINE & TOOL CO., 911 Porter St., Detroit 26.

NICHOLSON FILE CO., Providence 1, R. I.

OHIO KNIFE CO., Dreman Ave., Cincinnati 23.

O.K. TOOL CO., Shelton, Conn.

Pipe Machinery Co., 930 E. 70th St., Cleveland 8.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., 436 Capitol Ave., West Hartford, Conn.

SEVERANCE TOOL INDUSTRIES, INC., 742 Iowa Ave., Saginaw, Mich.

SIMMONDS SAW & STEEL CO., 470 Main St., Fitchburg, Mass.

STANDARD TOOL CO., 6900 Central Ave., Cleveland 4.

THOMPSON, HENRY G. & SON CO., Chapel & Mill Sts., New Haven 5, Conn.

THREADWELL TAP & DIE CO., Greenfield, Mass.

VICTOR SAW WORKS, INC., Middletown, N. Y.

WAPAKONETA MACHINE CO., Wapakoneta, Ohio.

WELLS MFG., CO., 202 Washington Ave., Three Rivers, Mich.

WENDT-SONIS CO., 10th & Collier Sts., Hannibal, Mo.

WESTERN ALLOY TOOL & STEEL CO., Hartford, Conn.

Cylinders, Air & Hydraulic

HANNIFIN MFG. CO., 1101 So. Kilbourne Ave., Chicago 24.

TOMKINS-JOHNSON CO., 617 No. Mechanic St., Jackson, Mich.

Cylinders, Gas

Adel Precision Products Corp., Van Owen & Riverton St., Burbank, Cal.

Alloy Products Corp., 1045 Perkins Ave., Waukesha, Wis.

Columbia Steel Co., Russ Bldg., San Francisco.

Dayton Rogers Mfg. Co., 2835 12th Ave., Minneapolis 7.

HARRISBURG STEEL CORP., 10th St., Harrisburg, Pa.

HANNIFIN MFG. CO., 1101 So. Kilbourne Ave., Chicago 24.

LINDE AIR PRODUCTS CO., 30 E. 42nd St., New York 17.

MESTA MACHINE CO., P. O. Box 1466, Pittsburgh 30.

MODERN ENGINEERING CO., 3405 W. Pine Blvd., St. Louis 3.

NATIONAL TUBE CO., Frick Bldg., Pittsburgh.

Production Devices, Inc., Whitehall, N. Y.

Ross Meehan Foundries, P. O. Box 1258, Chattanooga, Tenn.

Scaife Co., Oakmont, Pa.

Schrader's Son, A., 470 Vanderbuilt Ave., Brooklyn.

Taylor-Wharton Engineering Co., High Bridge, N. J.

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ACME STEEL COMPANY

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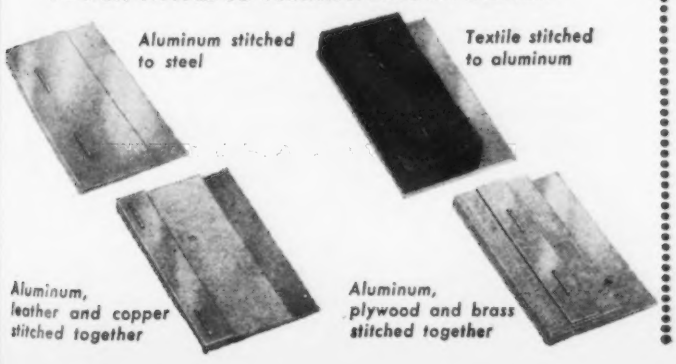
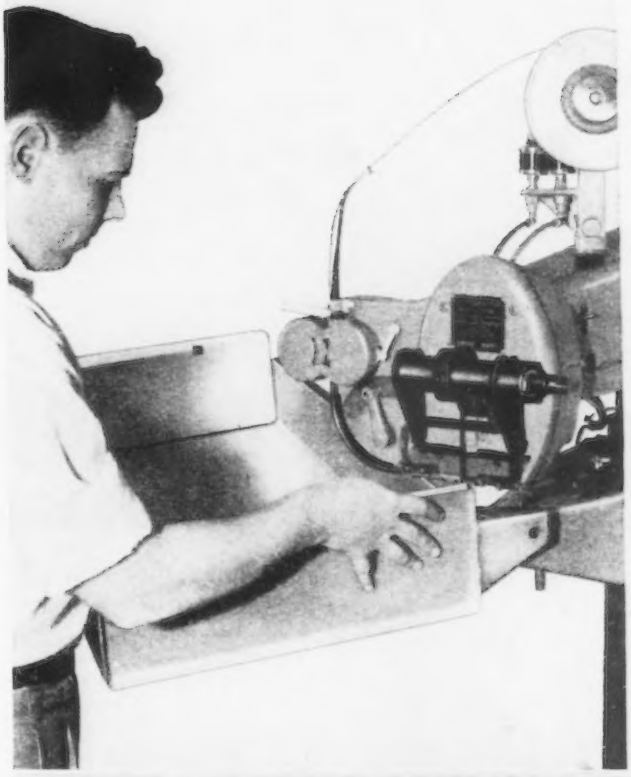


Aluminum stitched to steel

Textile stitched to aluminum

Aluminum, leather and copper stitched together

Aluminum, plywood and brass stitched together



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Chicago 8, Illinois

Gentlemen:

Please send me further details about the Metal Stitcher.

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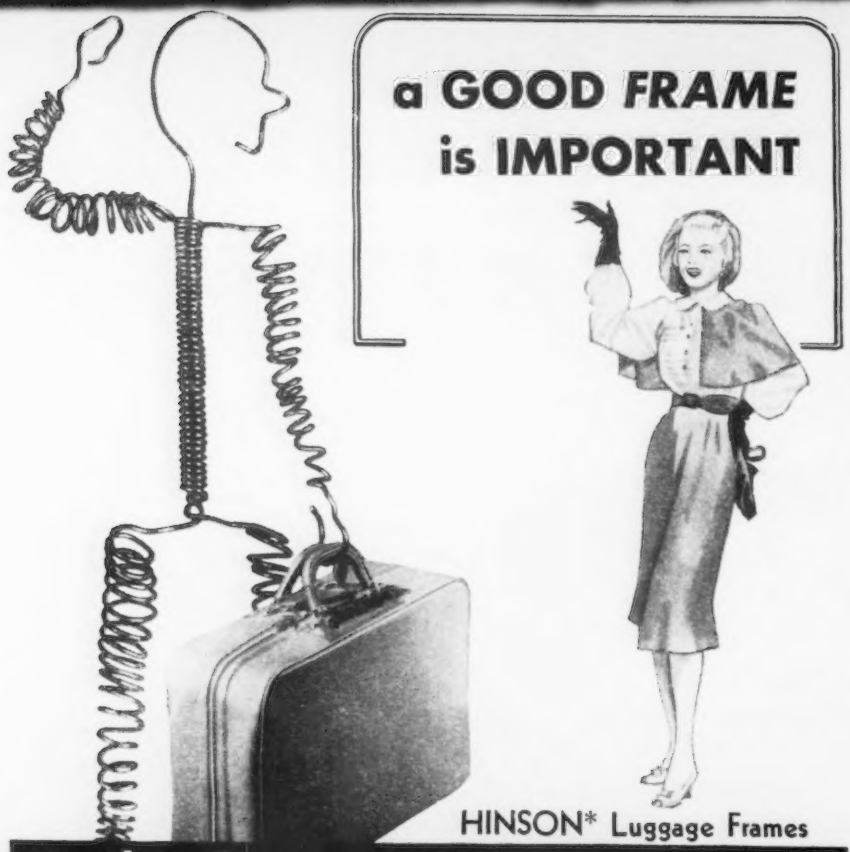
Company_____

Address_____

City_____ State_____



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BUYERS GUIDE

Wilson, K. R., 215 Main St., Buffalo 3.

WOOD & CO., R. D., Philadelphia.

Deaerators

Chain Belt Co., Bruce St., Milwaukee.

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Permutit Co., 330 W. 42nd St., New York.

Worthington Pump & Machinery Corp., Worthington Ave., Harrison, N. J.

Deammoniators

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Decalcomanias

American Tag Co., S. State St., Chicago.

Matthews Co., 1225 Beaufait St., Detroit.

National Decalcomania Corp., 260 N. 60th St., Philadelphia 39.

Palm Bros. Decalcomania Co., 3730 Regent Ave., Cincinnati 12.

Price Decal Co., 310 Bridge St., Brooklyn 1.

Decarbonators

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Liquid Conditioning Corp., Linden, N. J.

Degassers, Ferrous and Nonferrous

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Metal Hydrides, Inc., 16 Congress St., Beverly, Mass.

Niagara Falls Smelt. & Refg. Div., Continental-United Indus. Co. Inc., 2208 Elmwood Ave., Buffalo 17.

Vanadium Corp. of America, 420 Lexington Ave., New York 17.

Degreasing Compounds

Stull, A. J., & Co., 4420 St. Paul Ave., Frankford, Philadelphia 24.

Degreasing Machinery

Aeroil Products Co., 5714 Park Ave., West New York, N. J.

Beam-Knodel Co., 195 Lafayette St., New York 12.

DETREX CORP., 14331 Woodrow Wilson, Detroit 32.

Drill Mfg. Co., Circle Tower, Indianapolis 4, Ind.

Drying Systems, Inc., 1815 Foster Ave., Chicago.

Gray-Mills Co. Ridge Ave., Evanston, Ill.

Holcomb, J. L., Mfg. Co., Holcomb St., Indianapolis, Ind.

METALWASH MACHINERY CO., 149 Shaw Ave., Irvington 11, N. J.

Midwestern Sales, Inc., Flatiron Bldg., 5th Ave., New York.

Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.

OPTIMUS EQUIPMENT CO., 7 Water St., Matawan, N. J.

Phillips Mfg. Co., 3475 W. Touhy Ave., Northtown Sta., Chicago 45.

Stevens, Frederic B., Inc., 510 Third St., Detroit 26.

Stull, A. J., & Co., 4420 St. Paul Ave., Frankford, Philadelphia 24.

U. S. Galvanizing & Plating Equipment Corp., 27-41 Heyward St., Brooklyn 11.

Dehumidifying Apparatus

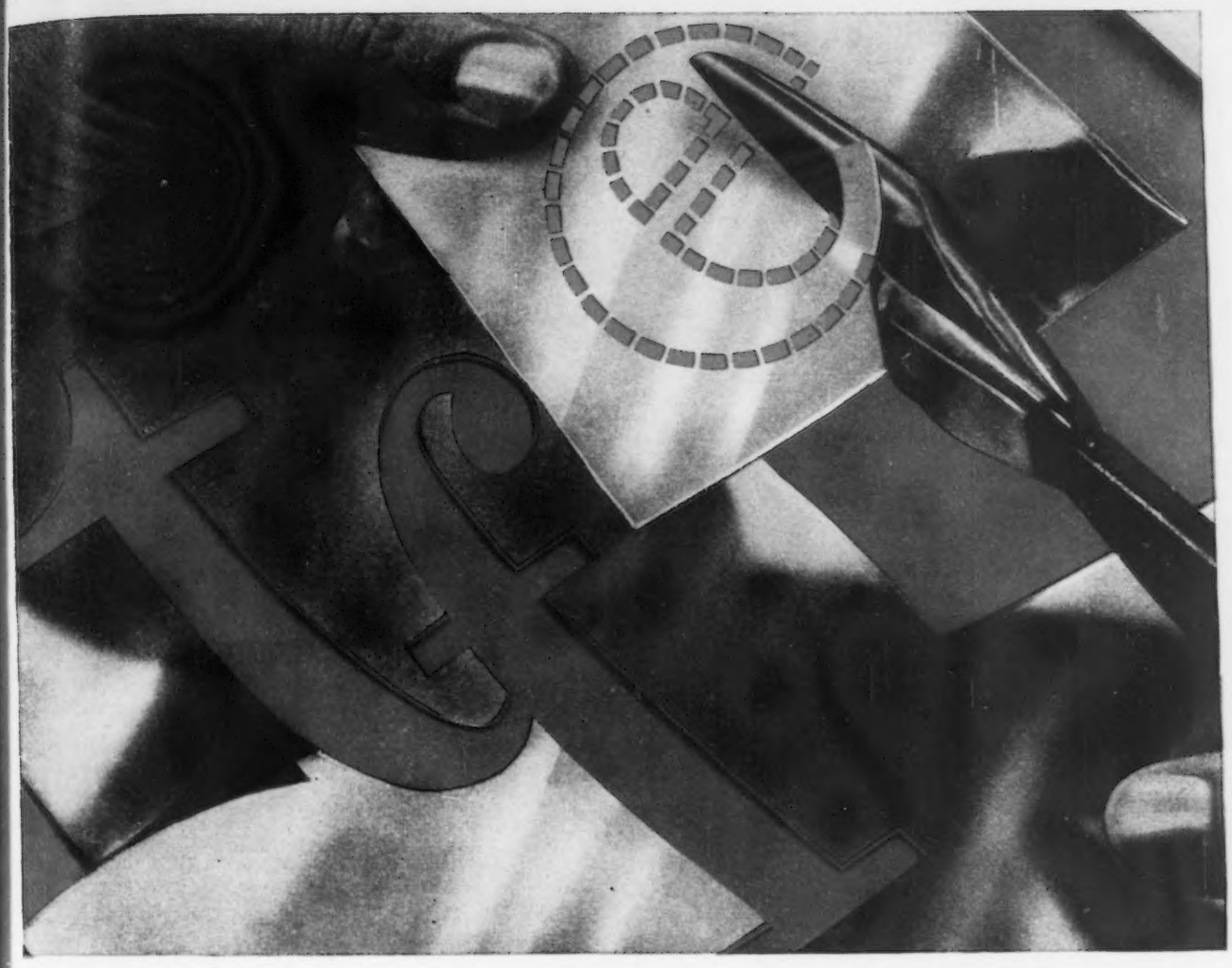
BLAW-KNOX CO., (Blast furnace), Farmers Bank Bldg., Pittsburgh.

Carrier Corp., Carrier Bldg., Syracuse, N. Y.

Nesbitt, John J., Inc., Tacony St., Philadelphia.

Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

SURFACE COMBUSTION CORP., Sherman St., Toledo, Ohio.



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BUYERS GUIDE

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, East Pittsburgh.

WHITING CORP., (Cupola), Harvey, Ill.

De-Ionized Water Equipment

Illinois Water Treatment Co., 840 Cedar St., Rockford, Ill.

Demagnetizers

Acme Tool Co., 96 Warren St., New York 7.

Annis, R. B., Co., 1101 N. Delaware St., Indianapolis 1.

BLANCHARD MACHINE CO., 64 State St., Cambridge 39, Mass.

L-W Chuck Co., 24 S. St. Clair St., Toledo 4.

Walker, O. S., Co., Inc., Worcester 6, Mass.

Demineralizing Equipment

Barnstead Still & Sterilizer Co., Inc., Forest Hills, Boston 31.

Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32.

Illinois Water Treatment Co., 840 Cedar St., Rockford, Ill.

Permutit Co., 330 W. 42nd St., New York.

Derricks, Steel

American Hoist & Derrick Co., 63 South Robert St., St. Paul 1.

Clyde Iron Works, Inc., Duluth, Minn.

Dobbie Foundry & Machine Co., Niagara Falls, N. Y.

Descaling Equipment, Chemical

AJAX ELECTRIC CO., INC., DIVISION OF THE AJAX METAL CO., 955 Frankford Ave., Philadelphia 23.

Dreisbach Engineering Corp., 85 Warburton Ave., Yonkers 2, N. Y.

PENNSYLVANIA SALT MFG. CO., 1600 Widener Bldg., Philadelphia 7.

Truco Products, Inc., P. O. Box 2649, Terminal Annex, Los Angeles 54.

U. S. Galvanizing & Plating Equipment Corp., 27-41 Heyward St., Brooklyn 11.

WOOD, R. D., & CO., Philadelphia, Pa.

Descaling Equipment, Flame

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17.

LINDE AIR PRODUCTS CO., 30 E. 42nd St., New York 17.

Desulfurizing Equipment

Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17.

Metal Hydrides, Inc., 16 Congress St., Beverly, Mass.

PITTSBURGH PLATE GLASS CO., COLUMBIA CHEMICAL DIV., 5th Ave. at Bellefield, Pittsburgh 13.

Dial Indicators, Precision Measuring

Anderson & Sons Co., Westfield, Mass.

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

BOTWINIK BROS. OF MASS., INC. (Distributors), 5 Sherman St., Worcester 1.

Brown Instrument Co. Div., Minneapolis-Honeywell Regulator Co., 4483 Wayne Ave., Philadelphia 44.

Cleveland Tool & Supply Co., 1427 W. 69th St., Cleveland 13.

Federal Products Corp., 1000 Eddy St., Providence 1.

Scherr, George, Co., Inc., 418 Broome St., New York 12.

Standard Gage Co., Inc., Poughkeepsie, N. Y.

Stewart Warner Corp., 1826 Diversey, Chicago 1.

Walsh Press & Die Co., 4630 W. Fulton St., Chicago 44.

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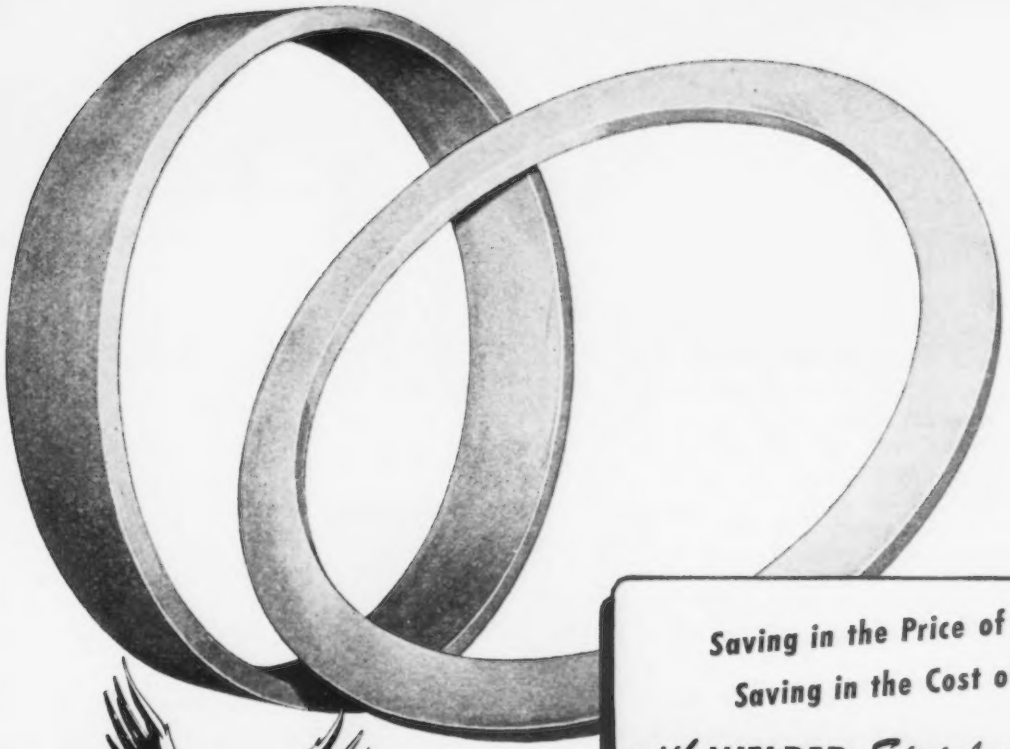
when stainless rings are produced by the welding process.

If you use stainless rings, or any other welded product, a few moments spent with our representative may prove to be very advantageous. May we hear from you?



Saving in the Price of Rings
Saving in the Cost of Tooling
with WELDED *Stainless Rings*

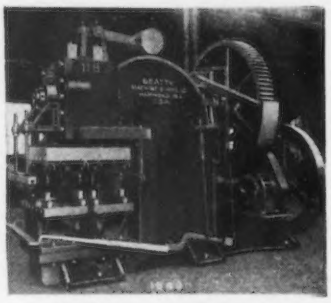
THE AMERICAN WELDING
AND MANUFACTURING COMPANY
1900 GRISWOLD ST. • WARREN, OHIO

YESTERDAY'S MACHINES

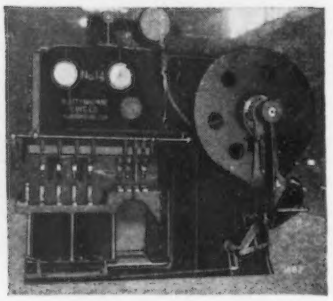
TOMORROW'S PROBLEMS

You can *win* or *lose* your battle of *sales* on *price*! *Obsolete* machinery means *high* production costs. But modern, *tailor-made* BEATTY-ENGINEERED machines can give you faster, higher-quality production at a *lower* cost. And you'll need that cost advantage in tomorrow's market. There's a better way to handle most production jobs. *Our* job is to help you find that *better* way. Call us in *now*. Our broad experience in metal working production qualifies us to handle the most difficult assignment.

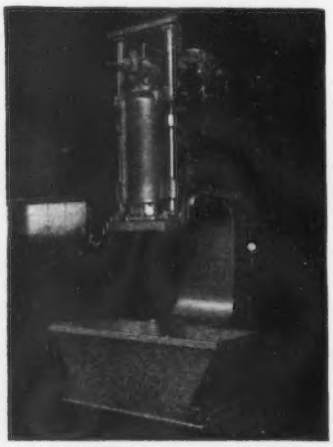
BEATTY Hydraulic Press Brake for V-bending, forming, pressing, flanging.



BEATTY Single End Punch available in capacities up to 350 tons. Ideal for car shops and jobs requiring multiple tooling.



BEATTY No. 14 Toggle Beam Punch for structural steel fabrication.



BEATTY 250-ton Gap Type Press for forming bending, flanging, pressing.

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

BUYERS GUIDE

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Golconda Diamond Products Corp., 3418-22 N. Knox Ave., Chicago 41.

Gorton, George, Machine Co., Racine, Wis.

KOEBEL DIAMOND TOOL CO., 9456 Grinnell Ave., Detroit 13.

Standard Diamond Tool Corp., 64 W. 48th St., New York.

Diamond Wheels

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

Cleveland Tool & Supply Co., 1427 W. 6th St., Cleveland 13.

Gorton, George, Machine Co., Racine, Wis.

KOEBEL DIAMOND TOOL CO., 9456 Grinnell Ave., Detroit 13.

Wall-Colmonoy Corp., 714 Fisher Bldg., Detroit 2.

Walsh Press & Die Co., 4630 W. Fulton St., Chicago 44.

Wickman Corp., 15533 Woodrow Wilson Ave., Detroit 3.

Die Blocks

Ajax Steel & Forge Co., 205 Adair St., Detroit 7.

AMERICAN SHEAR KNIFE CO., P. O. Box 355, Homestead, Pa.

Burnside Steel Foundry Co., 1300 E. 92nd St., Chicago 19.

CARPENTER STEEL CO., 321 W. Bern St., Reading, Pa.

Chicago Steel Foundry Co., Kedzie Ave. & 37th St., Chicago 32.

CONTINENTAL FOUNDRY & MACHINE CO., Grant Bldg., Pittsburgh.

DISSTON & SONS, HENRY, INC., 919 Tacony, Philadelphia 35.

Dyson, Joseph & Sons, Inc., 5123 St. Clair Ave., Cleveland 14.

HEPPENSTALL CO., Hatfield St., Pittsburgh 1.

NATIONAL FORGE & ORDNANCE CO., Irvine, Warren Co., Pa.

Paterson Steel & Forge Co., 1410 Stratford Ave., Stratford, Conn.

Ross-Meehan Foundries, P. O. Box 1258, Chattanooga, Tenn.

Walsh Press & Die Co., 4630 W. Fulton St., Chicago 44.

WICKES BROS., 512 N. Water St., Saginaw, Mich.

Diecasting Machines

CLEVELAND AUTOMATIC MACHINE, 1114 N.B.C. Bldg., Cleveland 14.

ERIE FOUNDRY CO., Erie, Pa.

General Machy. & Equip. Co., 180 So. 15th St., Harrisburg, Pa.

HYDRAULIC PRESS MFG CO., 1006 Marion Rd., Mt. Gilead, Ohio.

LAKE ERIE ENGINEERING CORP., Buffalo 17.

LESTER-PHOENIX INC., 2627 Church Ave., Cleveland 13.

Light Metal Machinery Inc., 736 Penton Building, Cleveland 13.

Phoenix Die Casting Co., 21 Illinois St., Buffalo 3.

REED-PRENTICE CORP., 667-677 Cambridge St., Worcester 4.

Ritterbush & Co., Inc., 50 Church St., New York 7.

Walsh Press & Die Co., 4630 W. Fulton St., Chicago 44.

Diecastings (see Castings, Die)

Die Heads

CONSOLIDATED MACHINE TOOL CORP., 2000 Thomas St., Rochester 10, N. Y.

EASTERN MACHINE SCREW CORP., 21-41 Barclay St., New Haven 6, Conn.

Geometric Tool Co., Blake & Valley Sts., New Haven 15, Conn.

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Movements of materials in the vast plant and shipyards of the Alabama Dry Dock & Ship Building Company, Mobile, Alabama, have been simplified and speeded up by the constant use of a powerful, economical Plymouth Locomotive.

Whether hauling carloads of heavy materials from storage tracks to the plant, or parts and equipment between the machine shop and dry docks, this locomotive provides unlimited, low-cost and dependable haulage with a minimum maintenance cost.

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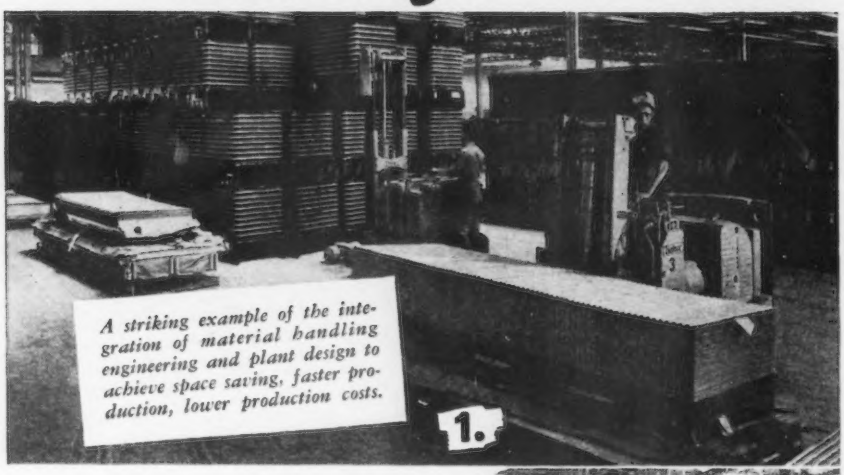
GASOLINE, DIESEL, AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U.S.A.

BAKER TRUCKS

play an essential role at the World's Largest Trailer Plant



A striking example of the integration of material handling engineering and plant design to achieve space saving, faster production, lower production costs.

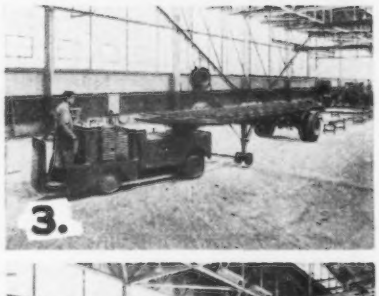
1.

● At the mammoth new plant of The Fruehauf Trailer Company a fleet of 15 Baker Trucks, with other handling equipment, helps to achieve new production records. A half-mile long assembly line parallels inside receiving platforms at trailer or rail car door level. Space between is devoted to sub assembly, production storage, etc. Baker Fork Trucks unload materials and prefabricated parts and transport them—on pallets whenever possible—to production storage—where they are tiered to conserve floor space other Baker Trucks assist in inter-department handling. (See illustrations 1 and 2.)

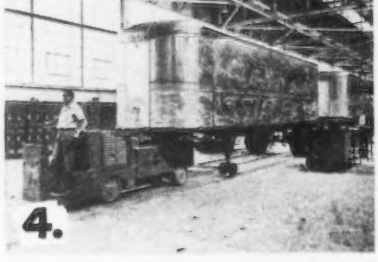
Six Baker Tractors, specially designed for Fruehauf with built-in elevating trailer coupler, pull partially built trailers between units of assembly line and take finished trailers from end of line. (See 3 and 4.) They also take trailers to and from modification departments. Because of their maneuverability, these trucks can operate in extremely small areas thus vitally affecting the original plant design.

If you are looking for improved production, a Baker Material Handling Engineer will help you.

2.



3.



4.

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
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Member
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Baker INDUSTRIAL TRUCKS

BUYERS GUIDE

Jarecki Mfg. Co., Wechsler Ave., Erie, Pa.

LANDIS MACHINE CO., Church & Fifth Sts., Waynesboro, Pa.

MURCHEY MACHINE & TOOL CO., 93 Porter St., Detroit 26, Mich.

Nye Tool & Machine Works, Co., 4100 N. Fullerton Ave., Chicago.

Rickert-Shafer Co., Erie, Pa.

Dielectrics, Liquid, Solid

Bakelite Corp., 300 Madison Ave., New York 17.

Die Making Machinery

BILLINGS & SPENCER CO., Laurel & Park Sts., Hartford 1.

BOTWINIK BROS. OF MASS., INC., (Distributors), 5 Sherman St., Worcester 1.

Knight, W. B., Machinery Co., 3920 W. Pine St., St. Louis 8.

Miles Machinery Co., 2025 E. Genesee Ave., Saginaw, Mich.

Oliver Instrument Co., Adrian, Mich.

Rogers Machine Works, Inc., 1807 Elmwood Ave., Buffalo 7.

Die Metal (Nonferrous, Cast-to-Shape)

Commerce Pattern Foundry & Machine Co., 7450 Melville at Green, Detroit 17.

FEDERAL METALS DIV., AMERICAN SMELTING REFINING CO., 120 Broadway, New York 5.

NATIONAL LEAD CO., 111 Broadway, New York 6.

Dies, Drawing, Forming, Punching

Ace Manufacturing Corp., 1237 E. Erie Ave., Philadelphia 24.

ADVANCE FOUNDRY CO., 103 Seminary Ave., Dayton 3, Ohio.

ALLEGHENY-LUDLUM STEEL CORP., Pittsburgh 22.

Atlas Tool & Designing Co., Castor & Kensington Ave., Philadelphia 24.

BALDT ANCHOR, CHAIN & FORGE DIV., BOSTON METALS CO., P. O. Box 350 Chester, Pa.

Brubaker, W. L., & Bros. Co., Railroad St., Millersburg, Pa.

BUDD CO., Dept. 16, 2450 Hunting Park Ave., Philadelphia 32.

CARBOLOY COMPANY, INC., 1153 E. 8-Mile Blvd., Detroit 32.

Chase Engineering & Mfg. Co., 501-509 E. Preston St., Baltimore 2.

CLEVELAND STEEL TOOL CO., 660 East 82nd St., Cleveland 8.

CONTINENTAL FOUNDRY & MACH. CO., Grant Bldg., Pittsburgh 19.

Crucible Steel Co. of America, 405 Lexington Ave., New York 17.

Cyril Bath Co., E. 70th & Machinery Ave., N. E., Cleveland 8.

Dickey-Grabler Co., 10302 Madison Ave., Cleveland 2.

Dies

Eastern Tool Supply Co., 176 Grand St., New York 13.

Ekstrom, Carlson & Co., Rockford, Ill.

Excelsior Tool & Machine Co., 30th to Ridge to Jefferson Ave., East St. Louis, Ill.

Hager, E. F. & Son, Queens Village, L. I., N. Y.

HEPPENSTALL CO., Hatfield St., Pittsburgh 1.

HOVIS SCREWLOCK CO., E. Nine-Mile Rd., Van Dyke, Mich.

Knowles, F. S., 77 W. Washington St., Chicago 2, Ill.

LESTER-PHOENIX INC., 2627 Church Ave., Cleveland 13.

MACKINTOSH HEMPHILL CO., 901 Binghamton St., Pittsburgh 3.

METAL CARHIDES CORP., 105 E. Indianola Ave., Youngstown 5, Ohio.

Moore Special Tool Co. Inc., 736 Union Ave., Bridgeport 7, Conn.

New England Carbide Tool Co., Inc., 60 Brookline St., Cambridge 39, Mass.

For Precision Grinding Results
in Job Shop - Tool Room - Volume Production

low unit cost / fine finishes / close tolerances

4" Type H

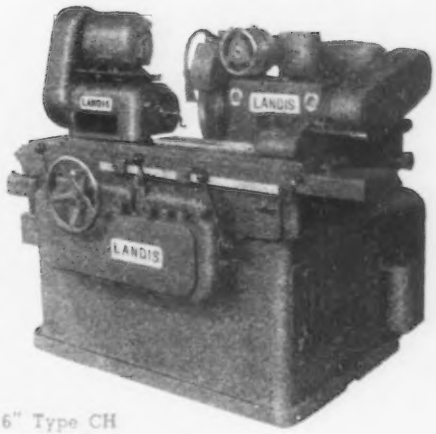
10"—14" Type CH

LANDIS TOOL plain hydraulic grinders

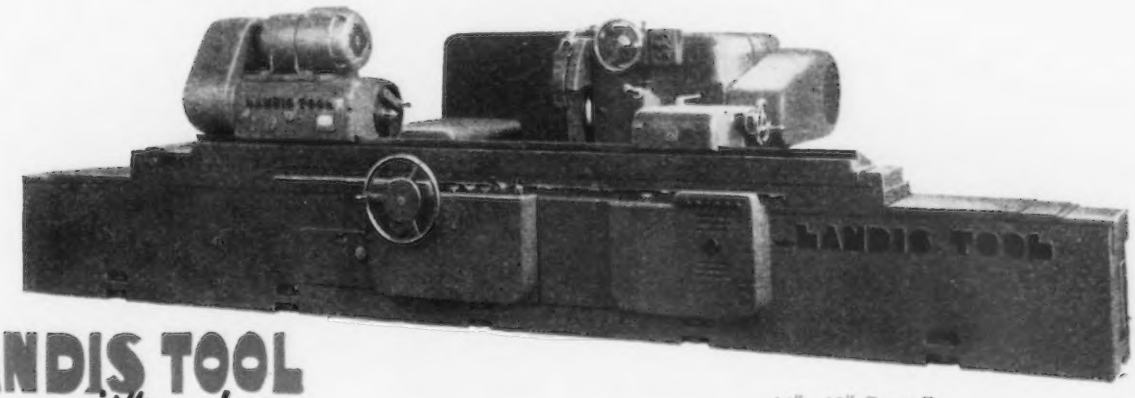
check the features

	TWO SPEED HAND TRAVERSE	*HYDRAULIC WHEEL FEED	HYDRAULIC TABLE TRAVERSE	HAND AND AUTOMATIC WHEEL FEED	MICROSPHERE WHEEL SPINDLE BEARINGS
4" Type H	✓	✓*	✓	✓	✓
6" Type CH 10" Type LCH	✓	✓*	✓	✓	✓
10"—14" Type CH	✓	✓*	✓	✓	✓
14"—16" Type F		✓*	✓	✓	✓

* Hydraulic straight infeed available as optional equipment.



6" Type CH



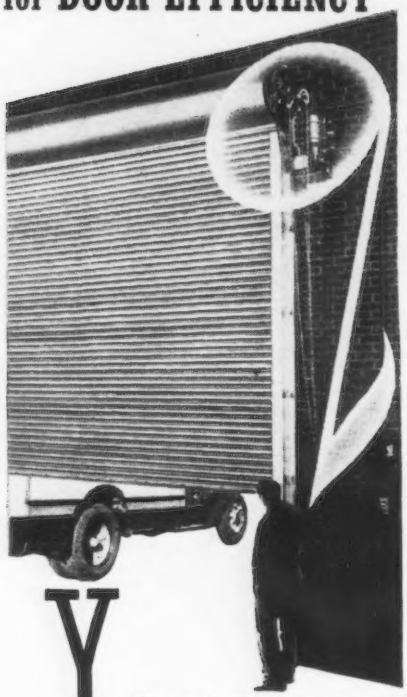
14"—16" Type F

LANDIS TOOL *Precision Grinders*

79A

LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

The
RIGHT NOTES
for DOOR EFFICIENCY



You keep *door performance* in tune with plant efficiency when you install KINNEAR Motor Operated Rolling Doors. They respond instantly to the touch of a control button, from one or more switches placed anywhere in your plant. Their smooth, efficient, *vertical* action saves space, prevents accidents, avoids traffic tie-ups. They coil compactly out of the way overhead, safe from damage. The husky Kinnear Motor Operator stands up under hardest use. And there are extra years of protection and low-maintenance service in Kinnear's rugged, all-steel construction—as proved by hundreds of installations that have served continuously for 20, 30 and 40 years! For the "right notes" on efficient doors, send for Kinnear details today.

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Factories: 1760-80 Fields Ave., Columbus 16, Ohio
1742 Yosemite Avenue, San Francisco 24, California
Offices and Agents in Principal Cities

Saving Ways in Doorways
KINNEAR ROLLING DOORS

BUYERS GUIDE

Olofsson Tool & Die Co., Lansing 2, Mich.

Ordnance Gauge Co., 4080 Frankford Ave., Philadelphia 24.

Pessinger Tool & Stamping Co., 51 Meadowbrook Parkway, Buffalo 6.

Pioneer Engineering & Mfg. Co., 19649 John R, Detroit 3.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., West Hartford 1, Conn.

Precision Metal Workers, 3100-12 Caroll Ave., Chicago 12.

Quality Die Co., 9307 Baltimore Ave., Chicago 17.

Ross-Meehan Foundries, P. O. Box 1258, Chattanooga 1, Tenn.

STEEL IMPROVEMENT & FORGE CO., 970 E. 64th St., Cleveland 14.

TAFT-PEIRCE MFG. CO., Woonsocket, R. I.

Threadwell Tap & Die Co., Greenfield, Mass.

Toledo Machine & Tool Div., 1420 Hastings St., Toledo 7.

Union Twist Drill Co., Athol, Mass.

United Tool & Die Co., Elmwood, Conn.

Dies, Cemented Carbides

Beals, McCarthy & Rogers, Inc., (Distributors), 50 Terrace, Buffalo 5.

CARBOLOY CO., 1153 E. 8-Mile Blvd., Detroit 32.

Chase Engineering & Mfg. Co., 501-509 E. Preston St., Baltimore 2.

JESSOP STEEL CO., Washington, Pa.

METAL CARBIDES CORP., 103 E. Indianola Ave., Youngstown 5.

New England Carbide Tool Co., Inc., 60 Brookline St., Cambridge 39, Mass.

Willey's Carbide Tool Co., 1340 West Vernor Highway, Detroit.

Dies, Compression, Riveter

MERCHANT GEO. F., CO., 1420-34 Rockwell St., Chicago 8.

Diesel Electric Locomotives (see Locomotives, Diesel Electric)

Diesel Engines (see Engines, Diesel)

Diesel Mechanical Locomotives (see Locomotives, Diesel Mechanical)

Die Sinking Machines

BOTWINIK BROS. OF MASS., INC., (Distributors) 5 Sherman St., Worcester 1.

CINCINNATI MILLING GRINDING & MACHINES, INC., Cincinnati 9.

Coulter, James, Machine Co., Railroad Ave., Bridgeport 5, Conn.

Donahue Steel Products Co. Inc., 1919 W. 74th St., Chicago 36.

FARNHAM MFG. CO., Senica St., Buffalo 10, N. Y.

Fitchburg Engineering Corp., Fitchburg, Mass.

Frew Machine Co., 118 Suray St., Philadelphia.

Galbreath Machinery Co., (used), Empire Bldg., Pittsburgh.

General Machinery & Equipment Co., 180 So. 15th St., Harrisburg, Pa.

Gorton, George, Machine Co., 1111 W. 13th St., Racine, Wis.

Hill-Clarke Machinery Co., 648 W. Washington Blvd., Chicago 6.

KEARNEY & TRECKER CORP., 6789 W. National Ave., Milwaukee 14.

Knight, W. B., Machinery Co., 3920 W. Pine St., St. Louis 8.

Knowles, F. S., 77 W. Washington St., Chicago 2.

LAKE ERIE ENGINEERING CORP., Buffalo 17.

Le Maire Tool Co., 2665 S. Telegraph Rd., Dearborn, Mich.

MOREY MACHINERY CO., INC., 410 Broome St., New York 13.

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STAMPINGS with
Strenes Metal
DRAWING AND FORMING DIES

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Having been brought up the hard way, some engineers and diemakers insist that drawing and forming dies *must* be made out of tool steel. Generally, however, the advantages of contour-cast dies are recognized.

Strenes Metal is an alloy with characteristics especially suitable for drawing and forming dies. Proof of this is found in hundreds of cases where *Strenes Metal* dies are delivering an extraordinary number of perfect stampings between redressings.

We'll be glad to give you the evidence. The information will show you how to reduce your costs considerably along with improving your product. Tell us what your drawing and forming operations are and we'll tell you honestly what *Strenes Metal* dies will do for you.

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DAYTON 3, OHIO

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REED-PRENTICE CORP., 667-677 Cambridge St., Worcester 4.

Rowbottom Machine Co., Archer St., Waterbury, Conn.

Simmons Machine Tool Corp., Albany 1.

SNYDER TOOL & ENGINEERING CO., 3400 E. Lafayette Ave., Detroit 7.

SUNDSTRAND MACHINE TOOL CO., 2539 11th St., Rockford 2, Ill.

TOMKINS-JOHNSON CO., 617 No. Mechanic St., Jackson, Mich.

Thompson, Earl A., Co., Ferndale, Mich.

VAN NORMAN CO., 3590 Main St., Springfield, Mass.

West Pen Machinery Co., 1210 House Bldg., Pittsburgh 22.

Dies, Pipe Threading

Armstrong Mfg. Co., Knowlton St., Bridgeport, Conn.

ARMSTRONG BROS. TOOL CO., 5209 W. Armstrong Ave., Chicago 30.

Jarecki Mfg. Co., Wechsler Ave., Erie, Pa.

Nye Tool & Machine Co., Fullerton Ave., Chicago 39.

Toledo Pipe Threading Machine Co., Summit St., Toledo 4.

Union Twist Drill Co., Athol, Mass.

Dies, Screw Cutting

Armstrong Mfg. Co., Knowlton St., Bridgeport, Conn.

JONES & LAMSON MACHINE CO., Clinton & Whitmore Sts., Springfield, Vt.

PRATT & WHITNEY DIV., NILES-BEMENT-POND CO., West Hartford 1, Conn.

Union Twist Drill Co., Butterfield Div., Derby Line, Vt.

Dies, Sheet Metal Forming

Ace Manufacturing Corp., 1237 E. Erie Ave., Philadelphia 24.

AMERICAN SHEAR KNIFE CO., P. O. Box 355, Homestead, Pa.

Atlas Tool & Designing Co., Castor & Kensington Ave., Philadelphia 24.

BUDD CO., Dept. H, 2450 Hunting Park Ave., Philadelphia 32.

CARBOLOY COMPANY, INC., 11153 E. 8-Mile Blvd., Detroit 32.

Chase Engineering & Mfg. Co., 501-509 E. Preston St., Baltimore 2.

CINCINNATI SHAPER CO., Hopple, Garrard & Elam Sts., Cincinnati 25.

Cyril Bath Co., E. 70th & Machinery Ave., N. E., Cleveland 8.

Dickey-Grabler Co., 10302 Madison Ave., Cleveland 2.

Excelsior Tool & Machine Co., 30th to Ridge to Jefferson Ave., East St. Louis, Ill.

Indianapolis Machy. & Sup. Co., (Distributors), 1959-69 S. Meridian St., Indianapolis 6.

Moore Special Tool Co. Inc., 736 Union Ave., Bridgeport 7, Conn.

O'NEIL-IRWIN MFG. CO., 316 Eight Ave., So., Minneapolis 15.

Otto Konigslow Mfg. Co., E. 36th St. & Perkins Ave., Cleveland 14.

Pessinger Tool & Stamping Co., 51 Meadowbrook Parkway, Buffalo 6.

Ross-Meehan Foundries, P. O. Box 1258, Chattanooga, Tenn.

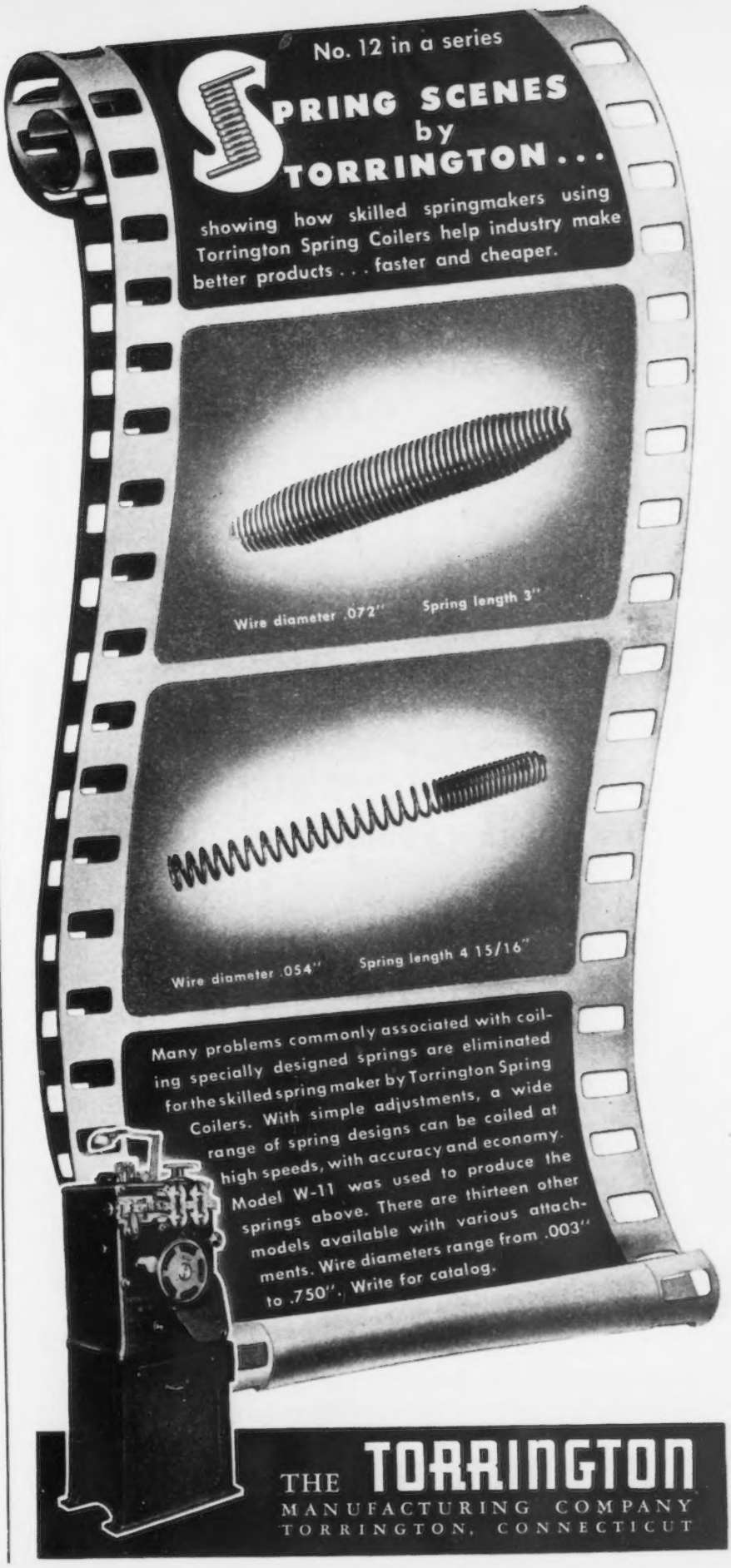
Steel Products Engr. Co., 1205 W. Columbia St., Springfield, Ohio.

Toledo Machine & Tool Div., 1420 Hastings St., Toledo 7.

United Tool & Die Co., Elmwood, Conn.

WARREN CITY MFG. CO., 1946 Griswold St., Warren, Ohio.

(TO BE CONTINUED)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SPRING SCENES by TORRINGTON . . .
showing how skilled springmakers using Torrington Spring Coilers help industry make better products . . . faster and cheaper.
Wire diameter .072" Spring length 3"
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Unqualified Excellence

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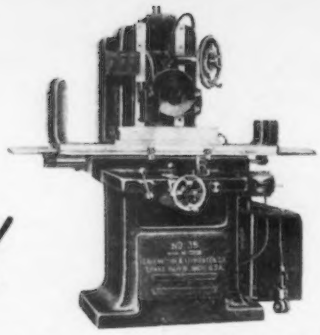

Grand Rapids No. 35
Hydraulic Feed
Surface Grinder
Write for Bulletin GL-101

Grand Rapids No. 60
Universal Cutter & Tool Grinder
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here's why • Every Grand Rapids Grinder, large or small, has every essential feature for fast, efficient, low-cost production. Refinements in construction details such as the massive castings, heavy, rigid spindles, separate spindle motors, assure years and years of trouble-free life.

GALLMEYER & LIVINGSTON CO., 200 STRAIGHT AVE., S.W., GRAND RAPIDS 4, MICH.

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High Temperature Porcelain

McDanel Tubes are precision made. Every stage of production is laboratory controlled, thus guaranteeing proper density, accurate bore size and thickness. Only perfect tubes are permitted to leave our plant. That's why McDanel Tubes stand up in service. Now preferred and used by leading metallurgical laboratories from coast to coast for carbon and sulphur determination in Iron and Steel analysis. Made in straight, tapered and double reduced, self-cooling ends.

Specify McDanel High Temperature Combustion Tubes from your supplier.

McDanel Combustion Tubes are cast as one integral unit. Above illustration shows tube being removed from the mold.

McDanel Refractory Porcelain Co.
Beaver Falls · · · Penna.

Statistics Show 2.4 Pct Labor Turnover Per Month in Steel Plants

Washington

• • • **The steel industry** will need about 12,000 unskilled workers a month for an indefinite period to replace employment separations, the Labor Dept. said last week in a new study of employment trends in the industry.

Present outlook is for continued high production and employment "for many months to come," the department's U. S. Employment Service commented in the study. USES based this view on estimates that it "will be a year or two" before planned expansion comes into production.

"The steady rate of production is reflected in corresponding employment levels," USES noted. The agency says that 128 steel plants reported in December that they employed 486,200 workers, "scarcely any change at all since October" when it was reported to be 487,000.

"Only 5600 additional workers are expected to be needed by the 128 plants by the middle of April," USES said. "The bulk of the industry's labor needs result from turnover. The separation rate, however, is low—only 2.2 in November—but even at this low rate the industry needs some 12,000 workers each month to replace workers who leave. Most of the workers required are for unskilled jobs at entry rates of pay. There are also limited openings for structural steel workers, machinists, boilermakers, refractory bricklayers, pipe fitters, carpenters, electricians, welders and crane operators.

"Except for a few highly skilled jobs, there is no difficulty in filling openings. In a few cases where special types of workers are difficult to obtain locally, the Employment Service is recruiting outside the area. Generally, the industry has an ample labor supply and seldom finds it is necessary to schedule more than a 40-hr week. Composition of the labor force has changed very little in the last six months. In December, women represented 4.1 pct of total employment; veterans, 28.4 pct, and nonwhites, 12.5 pct," the summary stated.

Correct Furnace Atmosphere

You'll Always Know with a

GORDON

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Do you depend upon badly scaled or decarburized work to tell you that something has happened to your furnace atmosphere? And then spoil more work getting the atmosphere back to where it belongs?

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The Gordon Furnace Atmosphere Indicator works on the principle of the relative thermal conductivity of gases. It is so simple and easy to use that top results can be obtained with shop or non-technical personnel.

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Canadian Pig Iron Output in December 72.4 Pct Capacity

Toronto

• • • **Canadian pig iron** production for December amounted to 165,551 net tons or 72.4 pct of rated capacity, compared with 174,147 tons or 76.1 pct for November and 161,464 tons in December, 1946. Output for the month under review included 132,738 tons of basic iron, of which 117,800 tons were for further use of producing firms and 14,938 tons for sale; 16,334 tons of foundry iron, with 280 tons for further use and 16,054 tons for sale; 16,479 tons of malleable iron all for sale.

Charges to blast furnaces in December included 312,779 tons of iron ore, 21,371 tons of mill sinder, scale, sinter, etc., and 5819 tons of scrap iron and steel.

For the full year, 1947, production of pig iron totalled 1,969,847 net tons compared with 1,403,767 tons in 1946 and 1,777,958 tons in 1945. Last year production included 1,587,615 tons of basic iron, of which 98,475 tons were for sale and 1,489,140 tons for further use; 234,777 tons of foundry iron with 230,434 tons for sale and 4343 tons for further use, and 147,455 tons of malleable iron, all for sale.

Production of ferro-alloys in December fell to 10,888 net tons from 11,551 tons in November and 11,766 tons in December, 1946. Output for the month under review included ferrosilicon, silicomanganese, ferromanganese, ferrochrome, chorm-x and ferrophosphorus.

For the full year, 1947, production of ferro-alloys totalled 149,832 net tons, against 116,996 tons in 1946 and 186,978 tons in 1945.

Following are comparative monthly production figures on pig iron and ferro-alloys for 1947 in net tons:

	Pig Iron	*Ferro-Alloys*
January	177,313	9,644
February	150,632	9,357
March	164,403	14,197
April	160,749	13,015
May	160,230	15,325
June	159,826	16,212
July	157,153	12,402
August	166,878	11,398
September	169,630	11,152
October	163,335	14,691
November	174,147	11,551
December	165,551	10,888
Totals, 1947	1,969,847	149,832

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S

New Licensing Action Simplifies Exporting To Multiple Consignees

Washington

• • • **The first of a** series of Commerce Dept. actions designed to simplify the licensing of exports to Europe will become effective on March 1. It affects products not on the positive list of goods in short supply.

The action provides that a single license, known as a Multiple Consignee Export License (MCL), may be issued for accepted orders from two or more consignees for shipment of the same commodity to the same country, in Group R. The list of iron and steel products affected are listed in Current Export Bulletin 440.

Although somewhat similar to the present blanket license procedure, the BLT will continue in effect for certain commodities on the positive list. Under BLT it is necessary only to list the total amount of consignment without regard to amounts to individual consignees; but, under the new MCL, individual quantities must be listed.

Exporters, however, will not be limited to a single MCL application for the export of the same commodity to the same country during a calendar quarter.

Commerce Dept. Order To Limit Export Licenses

Washington

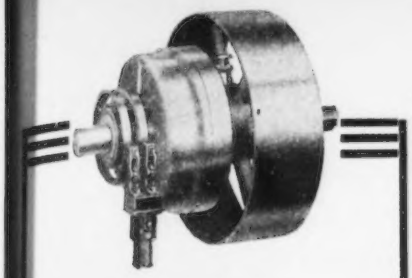
• • • **Effective Feb. 9,** the validity period of export licenses for waste tinplate, strips, rings and circles (Schedule B, Nos. 601300-601400) has been restricted to 90 days from date of validation.

Any such licenses still valid but issued prior to Dec. 1, 1947, will become invalid on Feb. 29 unless used prior to that date.

At the same time, there has also been a revision of policy for licensing exports of iron and steel products classified as surplus or rejects. Except in special or unusual circumstances, licenses will be issued for a period of only 90 days. Extensions will be granted only under thoroughly justifiable circumstances.

Exporters are reminded in the Commerce order that provisions of its export schedules requiring submission of proof of availability of material are not affected by the change and are still in force.

SPEEDS TURNAROUND—*With coal pouring out of the hopper doors, workmen at the Inland Steel Co., East Chicago, Ind., observe the Robins car shakeout emptying a car in* 2 *to* 5 *min. Prior to the introduction of this equipment unloading hopper cars took* 8 *to* 11 *men from* 15 *min to more than an hr.*



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Big Year Forecast For Auto Industry After USES Survey

Washington

• • • **At least 20,000** workers will be added to payrolls of the automotive industry during the first quarter 1948, it is forecast by the U. S. Employment Service.

In addition, at least 30,000 more will be needed each month as replacements for those workers who will be quitting for various reasons. Employment in the industry stood at 1,008,000 on January 1, having passed the million mark for the first time in December.

Three-fifths of the increasing new jobs will be in the plants engaged in actual manufacture and assembly, USES said after a survey of more than 260 plants which employ about 70 pct of all automotive workers. Another fifth of the jobs will open up in plants manufacturing passenger car bodies.

The USES also predicts production will equal if not pass the 1929 record of 5,400,000 units.

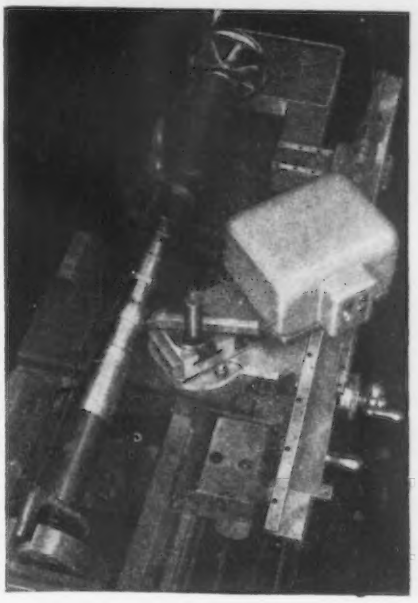
Sterling Engine Co. Seeks Credit Relief To Combat Shortages

Buffalo

• • • **Sterling Engine Co.** recently filed a petition in U. S. District Court here under Chapter 11 of the Chandler Act for an arrangement with creditors. The action followed filing of a tax lien for $119,377 by the Bureau of Internal Revenue, mostly for 1943 income taxes. The company listed debts, including contingent liabilities, of $2,491,824 and assets of $3,658,319.

Sterling said unfilled orders for gasoline and Diesel engines totaled about $2 million, but that it had been unable to secure essential parts from suppliers because of a lack of working capital. The Sterling plant here closed Jan. 26 due to lack of parts, affecting 376 workers.

In a plan outlined to the court, Sterling said the full cooperation of its vendors in supplying needed parts, materials and supplies on regular open-account terms "is anticipated," with such items being paid promptly in accordance with such terms.



Duplicates precision work automatically

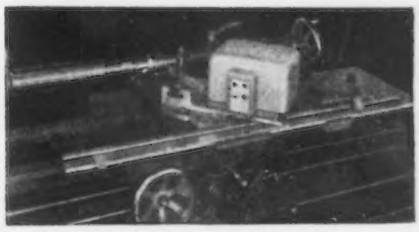
Shaft Volume Increased With Electric Duplicator

Shaft production has been increased five times by a new electric duplicating attachment recently introduced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. This new device, which operates on the template-tracer principle, has cut machining time from 30 minutes to 6 on one job alone. It is excellent for profile facing as well.

The new duplicator can be installed in ten minutes on any Regal or Dual Drive without drilling or fitting, and can be plugged into the nearest light socket. It is controlled by electric push buttons.

It brings automatic sizing to Regals and Dual Drives, and will perform every duplicating function with accuracy of .0015" to .002".

For full information on this time- and labor-saving device, send for bulletin EC-1. The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.



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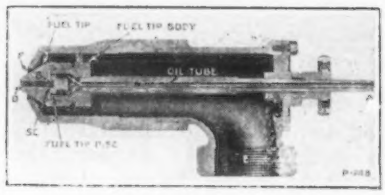

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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

Weekly Gallup Polls

(CONTINUED FROM PAGE 125)

Republican vote but draws heavily from the independent voters as well. This is shown in the following table:

Independent Voters

	Pct
Stassen	39
Truman	33
Wallace	15
No opinion	13

Roughly 12 million of the nation's voters classify themselves as independents, bearing allegiance to no organized party. During Roosevelt's terms of office these independent voters favored him strongly over his opponents.

The Truman - Stassen - Wallace "trial heat" was conducted after General Eisenhower bowed out of the race and after some of the Eisenhower Clubs had declared for Stassen, and to this extent reflects current political leanings among voters.

Stassen appeals to the same groups of voters as did General Eisenhower at the time of his withdrawal. Like the general, he leads Mr. Truman among independent voters.

Mr. Stassen's current favorable standing may be due in part to his becoming better known to large groups of voters in recent weeks. Not only has he been campaigning vigorously, but newspapers throughout the country have given front-page headlines to his attacks against "insiders" in commodity markets whom he alleged had made profits by speculating.

NLRB Declares Watchmen Must Bargain Separately

Washington

• • • **Under an NLRB** decision handed down in a case involving the C. V. Hill & Co., N. J., refrigerator manufacturers, watchmen cannot be included in the same collective bargaining unit as other employees.

Though they do not wear uniforms, are not armed and are not deputized in any way, the board ruled, they are still "plant protection employees" under the Taft-Hartley Act. They must be excluded even though they may be responsible to the same boss as production workers.

Export Quotas Issued For First Quarter By Commerce Department

Washington

• • • A new list of first quarter export quotas covering metal products has been issued by the Office of International Trade, Commerce Dept. The following list of commodities, showing first quarter quotas in short tons except where other units are indicated, is in addition to the list presented in THE IRON AGE, Feb. 12, p. 118:

Prefabricated and ready-cut house units (include portable houses, knockdown, wood)	
Prefabricated houses (chief value steel)	720
Aluminum prefabricated houses (aluminum chief value)	
Metal window frames (Dol.)	
Metal window sash	840,000
Metal fabricated door frames	
Cast iron soil pipe	
Cast iron soil pipe fittings	1,800
Woven-wire screen cloth, of all metals and alloys, insect (sq ft)	5,500,000
Refined copper, bus bars only	50
Old and scrap copper	1,000
Copper pipes and tubes	4,000
Copper plates, sheets, and strips	2,500
Copper rods[1]	1,000
Copper wire, bare[1, 2]	3,000
Rubber-covered wire, except lamp cord	3,000
Weatherproof wire	1,000
Other insulated copper wire[3]	5,000
Brass and bronze, scrap and old[4]	7,500
Brass and bronze ingots[4]	5,000
Brass and bronze bars, rods, and unfinished shafting	5,000
Brass and bronze blanks	
Brass and bronze plates, sheets and strips	5,000
Bronze circles	
Brass and bronze pipes or tubes (include pipe coils)	5,000
Brass and bronze pipe fittings	500
Brass and bronze wire, bare and insulated	3,000
Bronze structural shapes	
Brass and bronze castings and forgings	400
Lead pigs and bars (include blocks and ingots[5])	500
Lead sheets and pipes (include bends[5])	500
Lead solder[5, 6]	125
Type metal (antimonial lead)[5]	1,000
Lead anodes[5]	100
Lead foil and lead-tin foil[5]	50
Lead plate, or battery plate, not assembled as complete battery units[5]	3,000
Lead scrap and residues[5]	1,000
Lead castings; caulking yarn; circles; disks; flanges; plugs; powder; rings; metal packing rings; roof flanges; sash weights; shots; shrapnel; sinkers; strips; tape; washers; weights; wire; wool[5]	200
Collapsible tubes, tin[7]	4
Tin metal, in ingots, pigs, bars, blocks, slabs and other forms	15
Zinc cast in slabs, pigs, or blocks[8]:	
Special high grade, containing not over .007 pct lead, not over .005 pct iron, not over .005 pct cadmium, no aluminum, and at least 99.99 pct zinc	
High grade, containing not over .07 pct lead, not over .02 pct iron, not over .07 pct cadmium no aluminum and at least 99.90 pct zinc	
Intermediate, containing not over .20 pct lead, not over .03 pct iron, not over .50 pct cadmium, no aluminum and at least 99.50 pct zinc	5,000 (8)
Brass special, containing not over .60 pct lead, not over .03 pct iron, not over .50 pct cadmium, no aluminum and at least 99.00 pct zinc	
Selected, containing not over .80 pct lead, not over .04 pct iron, not over .75 pct cadmium, no aluminum, and at least 98.75 pct zinc	
Prime western, containing not over 1.60 pct lead, and not over .08 pct iron	
Other zinc cast in slabs, pigs or blocks	
Babbitt metal[9]	300
Antimony (include metals or regulus, needle or liquidated antimony, alloys, and antimony-bearing scrap metal	200
Cadmium metals (include metallic shapes)	200
Copper alloys in primary forms, except brass, bronze, nickel, or gold	500
Type (include multigraph type)	200
Rigid metal conduit, iron or steel (Dol.)	
Rigid metal conduit, other than iron or steel	2,325,000
Other metal conduit, outlet and switch boxes	
Freight cars, over 10-ton capacity (Units)	1,500

NOTE:

(1) Copper rods and copper wire bare, of foreign origin will be licensed without restriction.

(2) Not more than 250 tons shall consist of copperweld wire.

(3) Not more than 1000 tons shall consist of magnet wire.

(4) Tin content not to exceed 5 pct.

(5) Lead manufactures produced from bonded imports of lead or lead ore will be licensed without restriction.

(6) Tin content not to exceed 50 short tons.

(7) Licenses will be issued against this quota only for tin tubes to be used for certain medicinal and pharmaceutical purposes in accordance with Order M-43, Schedule 1, paragraph 2, listings 1 and 2.

(8) Zinc in slabs, pigs or blocks "in bond or produced from zinc in bond" will be licensed without restriction.

(9) Tin content not to exceed 108 short tons.

Koppers Enlarges Plant

Verona, Pa.

• • • **The Verona plant** of Koppers Co., Inc., resumed production here recently after a 6-week shutdown for improvement and expansion of production facilities. The factory, operated by Koppers Tar Products Div., manufactures Plastipitch coated metal sheets for use as siding and roofing. New equipment will increase production by 50 pct and will permit round-the-clock operation on a 3-shift basis, according to J. N. Forker, Koppers vice-president.

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MACHINE TOOLS

. . . News and Market Activities

Firm Orders Expected to Decrease; Foreign Orders May Help

• • • Vital statistics of the machine tool industry for January are expected to show some improvement over December, with higher new firm orders, lower shipments, and little change in cancellations, according to qualified sources in the trade.

New firm orders in January, primarily the result of price increases past and pending, will probably total about $21 million. Shipments, a partial result of efforts to clean up the books in December, will be down about 25 pct to 30 pct which will make for an increase in the backlog of unfilled orders.

New foreign firm orders amounted to about 15 pct of the new order total in January, and foreign shipments accounted for about 20 pct of total shipments, according to reliable estimates.

Indications are that February orders will be down, also March, normally the start of the automobile ordering. Some sources foresee a further drop in the machine tool business unless foreign orders are placed in sufficient volume to take up the growing slack in domestic markets.

In Detroit, most sources report a fair-to-satisfactory volume of machine tool business despite present indications that foreign orders are being reduced either because of dollar shortages or complex political setups, particularly in occupied countries.

Detroit tool and die shops, it is reported, have been working overtime during the past few weeks in an effort to keep the Ford new model program on schedule. Present indications are that the Lincoln-Mercury line will make its debut in April and that the new Ford will follow about 2 months later. A substantial amount of Chrysler work is reported in Detroit's die shops; at the moment no major GM tool and die program is reported in independent shops, although considerable work is undoubtedly going on within GM captive plants.

January Statistics Expected to Show Improvement Over December

o o o

The new tooling program for Reo has now reached its final stages and the letting of contracts is expected in less than 10 days. Progress on some heavy equipment in the Dodge forge plant is indicated, although this program is still several months away from completion. The initial fear that the Kaiser-Frazer tooling program might be seriously delayed has now given way to the more logical realization that the recent K-F financial setback was only a temporary condition that will undoubtedly be remedied in the near future.

The most extensive purchases of equipment for plant rehabilitation at the moment are reported at Oldsmobile and Chevrolet gear and axle; no substantial new tooling programs for General Motors are indicated.

Reports heard in Detroit that Chevrolet might step up its new tooling program in view of finalizing of the Ford plans have not been verified. A check of informed sources indicates that Chevrolet is well along with preparations for its 1949 model but seems to be in no great hurry at the moment.

Neither the Ford nor Chevrolet automatic transmission appears to be far enough along to permit introduction before September and the actual date may be even later in the year if it is not postponed until 1949.

In Chicago, sellers of machine tools report that February to date has been a much better month than January and that overall business volume remains high. The selling machine tools is now highly competitive and it is believed here that one of the reasons for the exceptionally good delivery given by the builders on standard lines of machines is competition.

The only standard types of machinery which cannot be had within 30 to 90 days are large presses and gear hobbers. Large press delivery promises in Chicago at the moment stand at 10 months with gear hobbers even further extended. On the rest of the items, 3 months is the longest, with many standard types of tools being promised in 1 to 4 weeks.

Machine tool builders themselves are operating far below capacity in production of standard machinery. Many of them have taken subcontract work to keep their shops busy. A few of the larger companies have accepted large orders to make printing press machinery. Others are branching out into fields they formerly serviced prewar, in the effort to keep their shops busy enough to hang on to their skilled workmen.

One leading machine tool builder in Milwaukee told THE IRON AGE last week that the highly specialized automatic type custom-built machines are not and never have been profitable items for a large machine tool builder. This type of machinery is being built by many such companies but in practically all cases the machinery is supplied with no profit to the builder and in many cases an actual loss. Smaller manufacturers who specialize in this automatic type of tooling, however, seem to be able, from reports given to THE IRON AGE, to stay in the black on the production of such tools.

Tucker Corp. has come through with a considerable number of inquiries for big presses, drilling equipment, broaching machines and some automatic transfer tools. All of this machinery, it is reported, will be used at the Dodge Chicago plant which Preston Tucker purchased from the government.

At the moment the trade does not expect any further important increases in machine tools and they attribute the present continued high volume of new business to the very healthy demand for all types of goods.

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NONFERROUS METALS

. . . News and Market Activities

Copper

• • • **Major producers** have sold out all their March copper but are not yet ready to open up for April sales. In most quarters it is acknowledged that consumers are unable to obtain their full requirements, but one producer points out that tonnages of fire-refined South American copper are still available. Requirements of the brass and wire mills are reported to be holding up. The foreign demand for copper continues strong and some sales for export were made at ⅛¢ higher than the previous peak of 21.75¢ f.a.s. New York. The weighted export refinery price crept up as high as 21.650¢ on Feb. 17, despite the fact that major producers are still selling for export at 21.50¢. The weighted export price rise bears watching as the principal factor that could bring about an increase in the domestic copper price.

A greater spread appeared in prices of some grades of ingot brass and bronze when a Philadelphia producer announced lower prices by ¼¢ per lb. The scrap market for copper and brass items was inactive last week because refineries and ingot producers were out of the market.

Figures of the Copper Institute for January revealed declines in the stock of refined metal in the United States and abroad during the month. Domestic stocks at the end of the month were only 71,533 short tons, down 4500 tons from the year end and approaching the low of last year in November. Foreign stocks were down to 132,845 tons, a decrease of more than 11,000 tons in the month. Officials of the industry say that these stocks at home and abroad are close to the irreducible minimum required for operations of producers and consumers. Crude copper production at home and abroad was 175,354 tons in January. Refinery production was 182,221 tons, reflecting declines of 6500 tons here and 7400 tons abroad. Deliveries to domestic customers during January reached 118,855 tons, higher than any month since March 1947. Deliveries to foreign customers were 79,962 tons.

•

Lead

• • • **Lead producers** are allocating metal to consumers for March on the basis of what becomes available to them each day. The market is still tight and consumers are unable to obtain their full requirements. The seasonal decline in battery makers' lead requirements is estimated by one producer at 1800 to 2000 tons for the reported decline of January shipments by 184,000 units. Nevertheless, January shipments of 2.4 million units is estimated to have required some 24,000 tons of lead. The pressure of this industry on lead supply is still down and metal which would have been consumed is being diverted by producers to the needs of other consumers. Prices remain unchanged.

•

Zinc

• • • **Consumer pressure** for deliveries of all grades of zinc is still high. The government is shipping concentrates into smelters for converting into High Grade for the strategic stockpile. The Office of Metals Reserve is now allocating High Grade zinc to consumers who are unable to obtain zinc from producers. Prices are unchanged.

Aluminum

• • • **In the present** tight market for aluminum products, mills dependent for their requirements of ingots were cut back severely late last year and their production of sheet, extrusions, wire, rod and bar has suffered correspondingly. In order to obtain ingots from their customary suppliers it has become necessary for such mills to go into the scrap market and see that their customers return to the primary producers the scrap developed from their fabricating operations. Mill salesmen are reported to be spending more time now in scrap accumulating activities than in serving their customers' requirements.

•

Tin

• • • **An increase** of 3119 long tons was reported in the tin stockpile of the Office of Metals Reserve in January. At the end of January the stockpile totalled 27,674 tons, according to information released by the Office of Materials Distribution. In January longhorn smelter production was 3172 tons, and imports were 4653 tons. Against these total receipts of 7825 tons, allocations were 5233 tons.

•

Marshall Plan Fosters Moroccan Mine Program

Paris

• • • **The Marshall Plan** has created important new developments in the mineral resources in French Morocco. Production of lead, manganese and antimony has almost doubled during 1947. Lead production increased from 15,500 to 27,500 metric tons annually. Manganese ore production increased from 55,000 to 118,000 tons. Cobalt production has increased from 1700 to 2400 tons.

Further increases in these minerals are expected during 1948. The expectation that manganese ore production may reach 500,000 tons a year is based on additional equipment and transport facilities being made available.

Nonferrous Metals Prices

Cents per pound

	Feb. 18	Feb. 19	Feb. 20	Feb. 21	Feb. 24
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be.	$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.	$40.00
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$80 to $90
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$77 to $79
Nickel, electro, f.o.b. New York	36.56¢
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$69 to $72
Silver, New York, cents per oz.	74.625
Tin, Grade A, New York	94.00
Zinc, East St. Louis	12.00
Zinc, New York	12.61
Zirconium copper, 6 pct Zr, per lb contained Zr.	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	18.50-19.25
No. 120	18.00-18.75
No. 123	17.50-18.25
80-10-10 ingot	
No. 305	24.25
No. 315	21.75
88-10-2 ingot	
No. 210	30.00
No. 215	28.00
No. 245	21.25-22.75
Yellow ingot	
No. 405	14.50-16.00
Manganese bronze	
No. 421	18.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.50-17.75
0.60 copper, max.	17.25-17.50
Piston alloys (No. 122 type)	16.50-16.75
No. 12 alum. (No. 2 grade)	16.25-16.75
108 alloy	16.25-16.50
195 alloy	16.50-16.75
AXS-679	16.50-17.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-95½ pct	16.50-17.00
Grade 2—92 pct-95 pct	16.00-16.50
Grade 3—90 pct-92 pct	15.50-16.00
Grade 4—85 pct-90 pct	15.25-15.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37⅝
Electrodeposited	32⅜
Rolled, oval, straight, delivered	33.09
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	33⅜
Zinc, cast, 99.99	20.50
Nickel 99 pct plus, frt. allowed	
Cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz lots per troy oz.	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	43.00
Copper sulfate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls. frt. allowed	14.50
Silver cyanide, 100 oz lots, per oz.	54.00
Sodium cyanide, 96 pct domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall; 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75-S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness; 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled. B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢, 10,000 lb base. B & S gage 00-1; 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in. 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Round Rod: M, diam, in., ⅛ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks		31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, lcl.	16.50-17.00
Ribbon	15.25-16.00
Plates	
Small	14.25
Large, over 12 in.	15.25

Copper, Brass, Bronze

Cents per pound, freight prepaid on 200 lb.

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.36*	31.39	31.70
Yellow brass	32.92*	29.85	30.16
Red brass	34.89*	31.92	32.23
Naval brass	30.28	29.03	34.97
Leaded brass	28.64	24.69	....
Commercial bronze	35.68*	32.96	33.27
Manganese bronze	33.87	32.37	38.47
Phosphor bronze, 5 pct	53.95*	52.95	52.70
Muntz metal	29.80	28.55	32.99
Everdur, Herculoy, Olympic, etc.	37.24	37.50	38.56
Nickel silver, 10 pct	41.80	42.68	40.54
5 pct	....	....	38.98
Architectural bronze	28.61	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1c per lb for shipments of 15,000 lb or more.)

	Heavy	Turnings
Copper	19⅛	18⅜
Yellow brass	15⅝	14⅝
Red brass	17½	16⅝
Commercial bronze	17⅝	16⅞
Manganese bronze	15¼	14⅝
Leaded brass rod ends	15¾	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1 copper, wire	18.00
No. 2 copper, wire	17.00
Light copper	16.00
Refining brass	15.50*

*Dry copper content

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.)

No. 1 copper, wire	17.00
No. 2 copper, wire	16.00
Light copper	15.00
No. 1 composition	14.00
No. 1 comp. turnings	13.75
Low brass	11.50
Brass pipe	11.00
Radiators	11.00
Heavy yellow brass	10.00
Aluminum	
Mixed old cast	9.75
Mixed old clips	9.75
Mixed turnings	9.00
Pots & pans	10.00
Low copper	10.50

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass	
No. 1 heavy copper and wire	16 —16½
No. 2 heavy copper and wire	15 —15½
Light copper	14 —14½
Auto radiators (unsweated)	9 — 9½
No. 1 composition	11½—12
No. 1 composition turnings	11 —11½
Clean red car boxes	9½— 9¾
Cocks and faucets	9¼— 9½
Mixed heavy yellow brass	7 — 7⅛
Old rolled brass	7½— 8
Brass Pipe	9 — 9¼
New soft brass clippings	11¼—11¾
Brass rod ends	9¾—10¼
No. 1 brass rod turnings	9¼— 9¾
Aluminum	
Alum. pistons with struts	4½— 5
Aluminum crankcases	6½— 7
2S aluminum clippings	9 — 9½
Old sheet & utensils	7 — 7½
Dry borings and turnings	2½— 3
Misc. cast aluminum	6½— 7
Dural clips (24S)	6 — 6½
Zinc	
New zinc clippings	7 — 7½
Old zinc	5 — 5½
Zinc routings	3 — 3½
Old die cast scrap	3 — 3½
Nickel and Monel	
Pure nickel clippings	16 —17
Clean nickel turnings	12½—13
Nickel anodes	16 —17
Nickel rod ends	16 —17
New Monel clippings	12 —13
Clean Monel turnings	7 — 8
Old sheet Monel	10 —10½
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	8 — 8½
Nickel silver turnings, mixed	6½— 7
Lead	
Soft scrap lead	12 —12½
Battery plates (dry)	7 — 7½
Magnesium Alloys	
Segregated solids	7½— 8
Castings	4½— 5½
Miscellaneous	
Block tin	75 —77
No. 1 pewter	60 —62
No. 1 auto babbitt	45 —47
Mixed common babbitt	13½—14
Solder joints	16½—17
Siphon tops	45 —47
Small foundry type	16 —16½
Monotype	15 —15½
Lino. and stereotype	14 —14½
Electrotype	11½—12
New type shell cuttings	14½—15
Clean hand picked type shells	6½— 7
Lino and stereo dross	6½— 7
Electro dross	4½— 5

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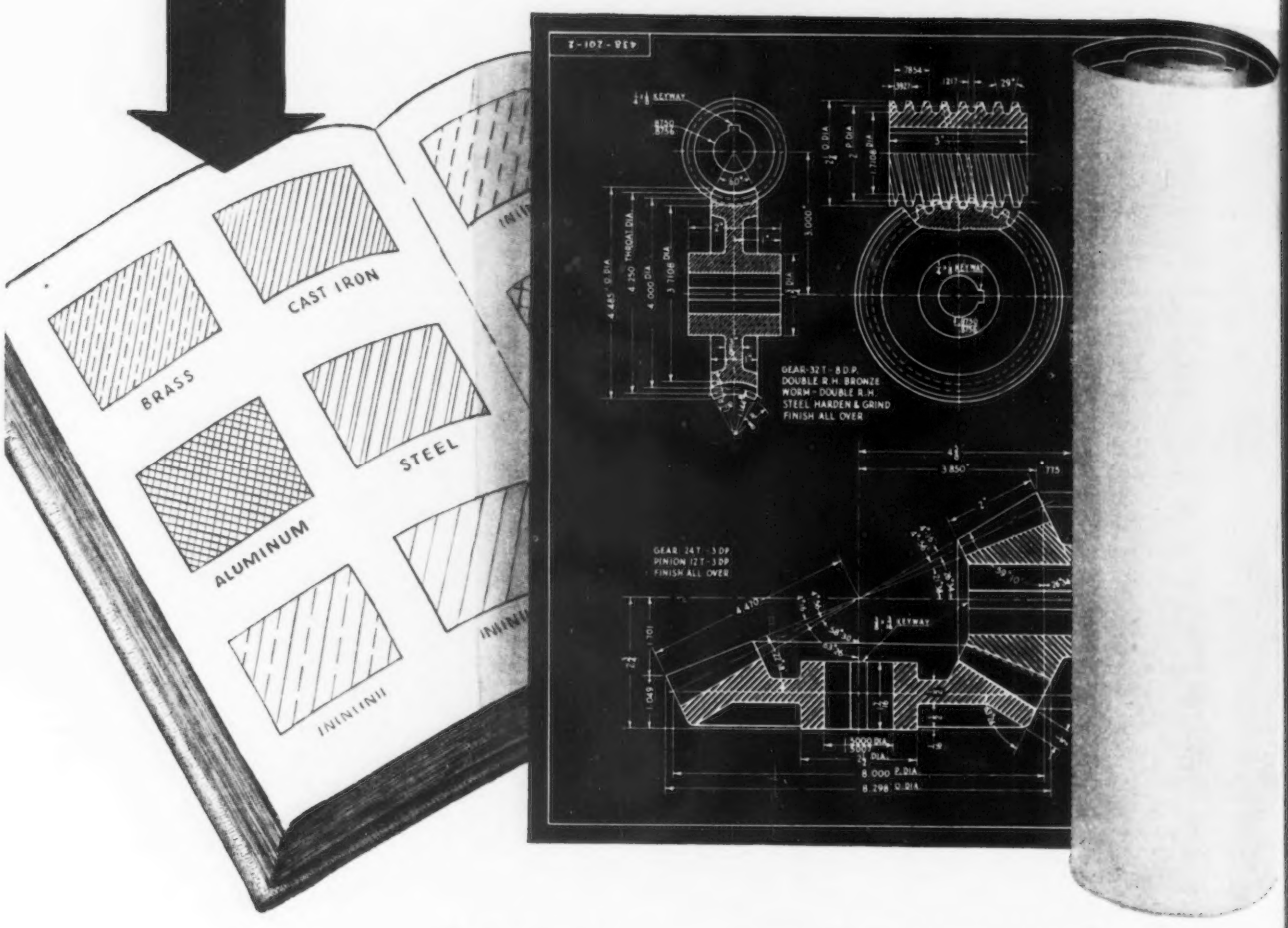

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SCRAP

Market Still Active as Softness Leaves

New York

• • • Most markets continued the period of increased activity which began with the break in commodity prices. But the trend toward softness tailed off before any price trimming could get moving.

Dealers, who last week were uneasy to the point of pushing sales at the formula and even lower, had their confidence bolstered by the stiffening of the general commodity market and by the price increases released by the steel firms.

Steel officials, in choosing this moment to jack up their prices, lost the psychological advantage they had gained and botched the best opportunity they've had in months to drive the market down.

In most areas where the market was especially soft last week there seemed to be a general stiffening without much change in prices. Moreover, the increase in steel prices, while failing to slow the activity, was expected by some to stiffen the market still more. Most sources were of the opinion that it will require several days, or even weeks, before its full effect will become apparent. Meanwhile, brokers and dealers remain cautious.

Warmer weather contributed to activity, but in most markets the increase in receipts was just a stirring and not a weakening factor.

In regard to thawing weather, the winter has been unusually severe, but collection efforts have been correspondingly vigorous so that no general increase over normal springtime supplies is expected.

Railroad lists showed considerable activity with offerings being made or immediately pending in many of the markets. Clarification on specialty items should come next week with no break in the cast and malleable prices expected.

•

PITTSBURGH — On prices, brokers here are on the fence. Some bearishness might be expected due to market action in other districts but they say it hasn't transmitted itself to this area yet. They don't deny that it may come soon. Actually, some grades have already weakened. The price for good grade industrial material that is part way between openhearth and genuine low phos is reported easing and turnings prices are being shaded. Short shoveling turnings appear headed down to formula figures by the end of the month. Railroad allocations have been held at the same prices. Shipments have improved a little, particularly from the mountain regions of Pennsylvania and West Virginia and better weather within the next month should improve them somewhat and perhaps soften prices.

•

CHICAGO—The only real activity last week was in shipping scrap to the mills. All mills report greatly increased receipts. At press time none of the mills were interested in buying any more scrap at either the high or low of the present price range. Even the foundries were laying low and only buying what they must have for immediate consumption. Pending railroad lists are expected to clarify the specialty items, but on the whole there appears to be no break in the cast and malleable prices. The fact that the mills were able to hold the formula price line during the worst two months of the year, seems to have convinced the trade that prices are due to fall off and may break sharply if the mild weather in the midwest continues.

•

PHILADELPHIA—Mills were out of the market for dealer heavy melting scrap last week, but the market remains firm at levels of the previous week. Sales of industrial and railroad scrap were reported at prices higher than dealer scrap levels. Shipments to mills have improved in recent milder weather. But dealers are reported to be no longer anxiously pressing scrap sales. Electric furnace bundles are selling 50¢ lower. Cast grades are firm at last week's prices despite the absence of Florence Pipe Foundry from the market.

•

CLEVELAND—Despite market weakening factors, scrap is still tight. Brokers are battling against each other, and in fact, one broker is reported paying as much as he is getting just to make shipments. Mills are determined not to pay more than formula and may take off openhearths rather than give in. Brokers for the most part are worried, with confirmed orders on their books and no scrap. Indications are that there will be no change in the market here or in the Valley until March 1, at least. Foundry grades are showing some weakness, perhaps in sympathy with price breaks in other sectors, but as a local wag quipped, "mills are having trouble melting paper."

DETROIT—Scrap buying here continues at formula levels. Despite recent plant shutdowns limiting scrap generation, the market is generally easier with mixed borings and turnings for blast furnace use showing the greatest weakness. Some sources feel that a break-through in the formula is now possible. Cast iron scrap is still in considerable demand but the price is off slightly this week.

•

BIRMINGHAM — Announcement of higher steel prices has resulted in a stronger scrap price undertone here. Trade sources also report that added firmness has been provided by renewed buying by the northern mills in southern markets. Mills in the Birmingham district still are able to get sufficient material at $37.50 to meet openhearth requirements.

•

BUFFALO — The market was very quiet last week and prices were unchanged in spite of bearish news items. One of the leading consumers repeatedly cancelled outstanding open orders because its stock pile had attained respectable proportions. Mills were extremely critical of quality and rejections continued to rise.

•

NEW YORK — Scrap shipments have been at much higher levels for the past ten days, due to the commodity break and the year's first warm spell. Brokers are keeping their fingers crossed hoping that the movement will continue. A lot of business is being done, at formula levels. Cast grades continue to move upward.

•

BOSTON—Milder weather has made it easier to get cars, but most kinds of scrap are still hard to get. Yards, disgruntled over prices, have something to do with that. Openly brokers are sticking to formula prices, but rumors of increases still circulate. Shoveling turnings have sold at $32, strictly No. 1 turnings for Canada at close to $29 and heavy steel at $34. There is not enough such business, however, to establish a market. Top paid for chemical borings this week was $35; for machinery cast $65 or $20 more than Mystic's base pig iron price.

•

ST. LOUIS—Mild spring-like weather in the St. Louis area brought improved receipts of scrap iron, but no price changes. In the railroad lists, Missouri Pacific is offering 41 carloads and the St. Louis-San Francisco 36 carlots.

•

CINCINNATI — There has been no change in the openhearth market here. Major consumers are continuing to buy at formula prices and material is moving fairly well. Unprepared railroad grades weakened noticeably last week, making consumers of these grades very wary, as it is still too early to tell whether the price weakness is temporary or permanent.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
RR. hvy. melting	41.00 to 41.50
No. 2 hvy. melting	40.00 to 40.50
RR. scrap rails	54.00 to 55.00
Rails 2 ft and under	59.00 to 60.00
No. 1 comp'd bundles	40.00 to 40.50
Hand bdld. new shts.	40.00 to 40.50
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.00 to 35.50
Shoveling turn.	38.00 to 38.50
Mixed bor. and turn.	35.00 to 35.50
Cast iron borings	38.50 to 39.00
No. 1 cupola cast.	59.00 to 60.00
Hvy. breakable cast.	45.00 to 46.00
Malleable	74.00 to 75.00
RR. knuck. and coup.	54.00 to 54.50
RR. coil springs	54.00 to 54.50
RR. leaf springs	54.00 to 54.50
Rolled steel wheels	54.00 to 54.50
Low phos.	47.00 to 48.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $39.50
No. 2 hvy. melting	38.00 to 39.50
No. 1 bundles	38.00 to 39.50
No. 2 dealers' bundles	38.00 to 39.50
Bundled mach. shop turn.	38.00 to 39.50
Galv. bundles	36.00 to 37.50
Mach. shop turn.	33.00 to 34.50
Short shov. turn.	35.00 to 36.50
Cast iron borings	34.00 to 35.50
Mix. borings & turn.	33.00 to 34.50
Low phos. hvy. forge	44.00 to 46.00
Low phos. plates	41.50 to 42.50
No. 1 RR. hvy. melt.	41.25 to 41.75
Rerolling rails	49.50 to 50.00
Miscellaneous rails	45.00 to 48.00
Angles & splice bars	51.00 to 52.00
Locomotive tires, cut	52.00 to 53.00
Cut bolster & side frames	45.00 to 48.00
Standard stl. car axles	53.00 to 54.00
No. 3 steel wheels	51.00 to 51.50
Couplers & knuckles	52.00 to 53.00
Rails 2 ft and under	50.00 to 55.00
Malleable	70.00 to 71.00
No. 1 mach. cast.	64.00 to 65.00
No. 1 agricul. cast.	62.00 to 63.00
Heavy breakable cast.	55.00 to 56.00
RR. grate bars	60.00 to 62.00
Cast iron brake shoes	60.00 to 61.00
Cast iron carwheels	58.00 to 60.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.50
No. 2 hvy. melting	38.50 to 39.50
No. 1 bundles	38.50 to 39.50
No. 2 bundles	38.50 to 39.50
Mach. shop turn.	33.00 to 33.50
Shoveling turn.	35.00 to 35.50
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	32.50 to 33.00
Low phos,. plate	46.00 to 48.00
No. 1 cupola cast	64.00 to 65.00
Hvy. breakable cast.	53.00 to 54.00
Rails 18 in. & under	60.00 to 61.00
Rails random length	52.00 to 53.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	$33.00 to $35.00
No. 2 hvy. meltign	31.65 to 31.90
Nos. 1 and 2 bundles	31.65 to 31.90
Busheling	31.65 to 31.90
Shoveling turn.	28.90
Machine shop turn.	26.90
Mixed bor. & turn.	26.90
Cl'n cast. chem. bor.	34.00 to 35.00
No. 1 machinery cast.	60.00 to 65.00
No. 2 machinery cast.	60.00 to 65.00
Heavy breakable cast.	60.00 to 65.00
Stove plate	45.00 to 50.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	$35.50
No. 2 hvy. melting	35.50
No. 1 bundles	35.50
New busheling	35.50
Flashings	35.50
Mach. shop turn.	$29.00 to 29.50
Shoveling turn.	30.00 to 30.50
Cast iron borings	30.00 to 30.50
Mixed bor. & turn.	28.50 to 29.00
Low phos. plate	39.50 to 40.50
No. 1 cupola cast.	58.00 to 61.00
Heavy breakable cast	50.00 to 54.00
Stove plate	50.00 to 54.00
Automotive cast	58.00 to 61.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.50 to $41.50
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	38.00 to 39.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	33.00 to 34.00
Mixed bor. & turn.	33.00 to 34.00
Clean cast chemical bor.	40.00 to 42.00
No. 1 machinery cast.	65.00 to 66.00
No. 1 mixed yard cast.	63.00 to 65.00
Hvy. breakable cast.	59.00 to 60.00
Clean auto cast.	63.00 to 65.00
Hvy. axle forge turn.	40.50 to 41.50
Low phos. plate	45.50 to 46.50
Low phos. punchings	45.50 to 46.50
Low phos. bundles	44.00 to 45.00
RR. steel wheels	51.00 to 52.00
RR. coil springs	51.00 to 52.00
RR. malleable	70.00 to 75.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	37.50 to 38.50
Bundled sheets	37.50 to 38.50
Mach. shop turn.	33.00 to 33.50
Locomotive tires, uncut.	46.00 to 48.00
Mis. std. sec. rails	50.00 to 51.00
Rerolling rails	52.00 to 53.00
Steel angle bars	57.00 to 58.00
Rails 3 ft and under	56.00 to 58.00
RR. steel springs	50.00 to 51.00
Steel car axles	52.00 to 53.00
Grate bars	56.00 to 57.00
Brake shoes	54.00 to 55.00
Malleable	71.00 to 72.00
Cast iron car wheels	54.00 to 55.00
No. 1 machinery cast.	64.00 to 65.00
Hvy. breakable cast.	52.00 to 53.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	37.50 to 38.50
No. 2 bundles	37.50 to 38.50
No. 1 busheling	37.50 to 38.50
Long turnings	25.00 to 26.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Bar crops and plate	38.00 to 38.50
Structural and plate	38.00 to 38.50
No. 1 cupola cast.	60.00 to 65.00
Stove plate	55.00 to 58.00
No. 1 RR. hvy. melt.	37.50 to 38.50
Steel axles	38.00 to 39.00
Scrap rails	44.00 to 45.00
Rerolling rails	52.00 to 54.00
Angles & splice bars	47.50 to 50.00
Rails 3 ft. & under	52.00 to 56.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
No. 2 hvy. melting	40.00 to 40.50
Mach. shop turn.	35.00 to 35.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos.	45.00 to 45.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$34.50
No. 2 hvy. melting	34.50
No. 2 bundles	34.50
Comp. galv. bundles	34.50
Mach. shop turn.	$30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Shoveling turn.	30.00 to 31.00
No. 1 cupola cast.	60.00 to 61.00
Clean auto cast.	60.00 to 61.00
Hvy. breakable cast.	55.00 to 56.00
Charging box cast.	55.00 to 56.00
Stove plate	51.00 to 52.00
Unstrp. motor blks.	50.00 to 51.00
Cl'n chem. cast bor.	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$44.00 to $46.00
No. 2 hvy. melting	39.75
No. 1 bundles	39.75
No. 2 bundles	39.75
No. 1 busheling	39.75
Mach. shop turn.	34.75 to 35.25
Shoveling turn.	36.75 to 37.25
Cast iron borings	35.75
Mixed bor. & turn.	34.75
Mixed cupola cast.	60.00 to 62.00
Charging box cast.	54.00 to 55.00
Stove plate	58.00 to 60.00
Clean auto cast.	62.00 to 65.00
RR. malleable	70.00 to 75.00
Small indl. malleable	47.00 to 49.00
Low phos. plate	48.00 to 50.00
Scrap rails	58.00 to 59.00
Rails 3 ft & under	60.00 to 61.00
RR. steel wheels	52.00 to 53.00
Cast iron carwheels	52.00 to 53.00
RR. coil & leaf spgs.	52.00 to 53.00
RR. knuckles & coup	52.00 to 53.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to $40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 1 busheling	39.50 to 40.00
Drop forge flashings	39.50 to 40.00
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	36.50 to 37.00
Steel axle turn.	39.50 to 40.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn.	35.50 to 36.00
Low phos.	44.50 to 45.00
No. 1 machinery cast.	65.00 to 70.00
Malleable	75.00 to 80.00
RR. cast.	70.00 to 73.00
Railroad grate bars	60.00 to 62.00
Stove plate	60.00 to 62.00
RR. hvy. melting	40.00 to 40.50
Rails 3 ft & under	60.00 to 61.00
Rails 18 in. & under	61.00 to 62.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 2 bales	25.00

Per gross ton delivered to consumer:

No. 3 bales	$19.50
Mach. shop turn.	16.00
Elec. furn. 1 ft und.	$32.00 to 34.00
No. 1 cupola cast.	32.00 to 33.00
RR. hvy. melting	24.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$25.50
No. 2 hvy. melting	25.50
No. 1 bales	25.50
No. 2 bales	25.50
No. 3 bales	19.50
Mach. shop turn.	17.50
No. 1 cupola cast.	$36.00 to 40.00
RR. hvy. melting	26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$26.50
Elec. furn. 1 ft and und.	$27.50 to 30.00
No. 1 cupola cast.	30.00 to 40.00
RR. hvy. melting	27.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prep'd	21.00*
Bushelings, new fact, unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast	$42.00 to 43.00
No. 2 cast	35.00 to 37.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Feb.24, 1948	Feb. 17, 1948	Jan. 27, 1948	Feb.25, 1947
Hot-rolled sheets	2.80	2.80	2.80	2.50
Cold-rolled sheets	3.55	3.55	3.55	3.20
Galvanized sheets (10 ga.)	3.95	3.95	3.95	3.55
Hot-rolled strip	2.80	2.80	2.80	2.50
Cold-rolled strip	3.55	3.55	3.55	3.20
Plates	2.95	2.95	2.95	2.65
Plates wrought iron	7.25	7.25	6.85	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes.	$6.80	$6.80	$6.80	$5.75
Tinplate, electro (0.50 lb)	6.00	6.00	6.00	5.05
Special coated mfg. ternes	5.90	5.90	5.90	4.90
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.60
Cold-finished bars	3.55	3.55	3.55	3.20
Alloy bars	3.30	3.30	3.30	3.05
Structural shapes	2.80	2.80	2.80	2.50
Stainless bars (No. 302)	26.00	26.00	26.00	26.00
Wrought iron bars	8.65	8.65	7.15	6.15
Wire: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.30
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$2.50
Light rails	3.10	3.10	3.10	2.85
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00†	$45.00	$45.00	$42.00
Slabs, rerolling	45.00†	45.00	45.00	42.00
Forging Billets	54.00†	54.00	55.00	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.55
Skelp	2.90	2.90	2.60	2.35

†Net ton

Pig Iron (per gross ton)	Feb.24, 1948	Feb. 17, 1948	Jan. 27, 1948	Feb.25, 1947
No. 2, foundry, Phila.	$44.61	$44.61	$44.61	$32.51
No. 2, Valley furnace	39.50	39.50	39.50	30.50
No. 2, Southern Cin'ti	43.28	43.28	43.28	31.75
No. 2, Birmingham	37.38	37.38	37.38	26.88
No. 2, foundry, Chicago†	39.00	39.00	39.00	30.50
Basic del'd Philadelphia	44.11	44.11	44.11	33.67
Basic, Valley furnace	39.00	39.00	39.00	30.00
Malleable, Chicago†	39.50	39.50	39.50	30.50
Malleable, Valley	39.50	39.50	39.50	30.50
Charcoal, Chicago	62.46	62.46	62.46	42.99
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	*$40.25*	$40.50	$40.50	$35.50
Heavy melt'g steel, Phila.	41.00	41.00	42.50	34.50
Heavy melt'g steel, Ch'go	38.75	38.75	39.50	32.25
No. 1, hy. comp. sheet, Det.	35.50	35.50	35.50	33.00
Low phos. Young'n	45.25	45.25	47.75	41.25
No. 1, cast, Pittsburgh	59.50	59.50	56.75	42.50
No. 1, cast, Philadelphia	65.50	65.50	59.00	46.00
No. 1, cast, Chicago	64.50	64.50*	69.50	44.25

*Revised

Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$9.00
Foundry coke, prompt	14.00	14.00	14.00	10.25

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	21.50	21.50	21.50	19.75
Copper, Lake Conn.	21.625	21.625	21.625	19.625
Tin, Grade A, New York	94.00	94.00	94.00	70.00
Zinc, East St. Louis	12.00	12.00	12.00	10.50
Lead, St. Louis	14.80	14.80	14.80	12.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.25

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Feb. 24, 1948	3.23940¢ per lb.	*$40.37* per gross ton	*$40.00* per gross ton
One week ago	3.23940¢ per lb.	$40.37 per gross ton	$40.08 per gross ton
One month ago	3.19411¢* per lb.	$40.17 per gross ton	$40.83 per gross ton
One year ago	2.86354¢ per lb.	$30.15 per gross ton	$34.08 per gross ton

*Revised

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1948	3.23940¢ Feb. 17	3.19411¢ Jan. 6	$40.37 Feb. 17	$39.58 Jan. 6	$41.83 Jan. 20	$40.00 Jan. 6
1947	3.19411¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Delivered Los Angeles; add ½¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases. Some producers charge (18) $2 more. (19) $1 more.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co. Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($36.00 per net ton f. o. b. mill) (Spot market as high as $75 to $90 gross ton)														
Carbon, forging	$46.00	(per net ton)													
Alloy	$56.00									(Canton — $56.00)					
BILLETS, BLOOMS, SLABS															
Carbon, rerolling[17]	$45.00[18]	$45.00[18]	$45.00[18]	$47.00	$45.00[18]	$45.00[18]	(per net ton)								
Carbon, forging billets	$54.00	$54.00	$54.00	$54.00	$54.00	$54.00	(per net ton)								
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton — $66.00)								
SHEET BARS								Subject to negotiation							
PIPE SKELP	2.90¢						2.90¢								
WIRE RODS	2.80¢[19]	2.80¢[19]		2.80¢[19]	2.85¢		(Worcester — 2.90¢[19])					3.52¢[13]			
SHEETS															
Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢		(Ashland, Ky. — 2.80¢)		3.54¢[16]	2.96¢	3.148¢	3.040¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.71¢	4.00¢	4.016¢
Galvanized (10 gage)	3.95¢	3.95¢	3.95¢		3.95¢		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland — 3.95¢)	4.62¢[16]		4.298¢	4.190¢
Enameling (12 gage)	3.95¢	3.95¢	3.95¢	3.95¢			3.95¢		4.05¢	3.95¢			4.11¢	4.466¢	4.406¢
Long ternes[2] (10 gage)	4.05¢		4.05¢											4.566¢	4.506¢
STRIP															
Hot-rolled[3]	2.80¢	2.80¢	2.80¢	2.80¢[18]	2.80¢		2.80¢					3.80¢[16]	2.96¢	3.316¢	3.256¢
Cold-rolled[4]	3.55¢	3.65¢	3.65¢	3.55¢			3.55¢			(Worcester — 3.75¢)			3.71¢	4.066¢	4.006¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.618¢	
TINPLATE															
Cokes, 1.50 lb[5], base box	$6.80	$6.80	$6.80		$6.90			$6.90	$6.90	(Warren, Ohio — $6.80)				$7.248	$7.140
Electro, box 0.25 lb	Deduct $1.00 from 1.50 lb coke base box price.														
Electro, box 0.50 lb	Deduct 80¢ from 1.50 lb coke base box price.														
Electro, box 0.75 lb	Deduct 60¢ from 1.50 lb coke base box price.														
TERNES, MFG., special coated	Deduct 90¢ from 1.50 lb coke base box price.														
BLACKPLATE, CANMAKING															
55 lb to 70 lb	Deduct $1.80 from 1.50 lb coke base box.														
75 lb to 95 lb	Deduct $1.70 from 1.50 lb coke base box.														
100 lb to 128 lb	Deduct $1.60 lb from 1.50 lb coke base box.														
BLACKPLATE, h. s. 29 ga[11]	4.75¢	4.75¢	4.75¢		4.85¢			4.85¢	4.85¢					5.198¢	5.090¢
BARS															
Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[16]	3.06¢	3.35¢	3.356¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[16]		3.098¢	2.990¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.71¢	4.00¢	4.008¢
Alloy, hot-rolled	3.30¢	3.30¢	3.30¢			3.30¢	3.30¢	(Bethlehem, Massillon, Canton — 3.30¢)							3.432¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢			(Canton — 4.10¢)						
PLATE															
Carbon steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville — 3.45¢, Claymont — 3.65¢, Geneva, Utah — 3.10¢) 2.95¢				3.838¢[14]		3.298¢	3.190¢
Floor plates	4.20¢	4.20¢		4.20¢										4.716¢	4.656¢
Alloy	3.80¢	3.80¢	3.80¢		(Coatesville — 4.80¢)									4.316¢	4.256¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah — 2.95¢, Bethlehem — 2.80¢)					3.43¢[16]		3.040¢	2.932¢
SPRING STEEL, C-R															
0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester — 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester — 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester — 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester — 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester — 9.65¢)								
MANUFACTURERS' WIRE[9]															
Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester — 3.65¢, Duluth — 3.80¢)					4.56¢[13]		4.022¢	4.006¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.60¢	4.60¢		4.60¢			(Worcester — 4.70¢, Duluth — 4.85¢) (Trenton — 4.85¢)					5.737¢[13]		5.072¢	4.964¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.75¢	3.756¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	38.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.80	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.46	30.30	23.80	24.34	34.82	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	28.75
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$2¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium* ..... 47¢
Oil hardening manganese* ..... 26¢
Special carbon* ..... 24¢
Extra carbon* ..... 20¢
Regular carbon* ..... 17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Armature	4.80¢ to 5.05¢
Electrical	5.30¢ to 5.55¢
Motor	6.05¢ to 6.30¢
Dynamo	6.75¢ to 7.50¢
Transformer 72	7.25¢ to 8.25¢
Transformer 65	7.95¢ to 9.20¢
Transformer 58	8.65¢ to 9.90¢
Transformer 52	9.45¢ to 9.70¢

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.45¢ for armature through 72, and 0.35¢ for balance.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb No. 1 O.H., per 100 lb $2.75
Angle splice bars, 100 lb 3.85
(F.o.b. basing points) *per 100 lb*
Light rails (from billets) $3.10

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.65¢
Tie plates, Pittsburg, Calif.	3.80¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, St. Louis, Kansas City, Minnequa, Colo.; Birmingham; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham

	Base per keg	Column San Francisco
Standard & coated nails*	94	115
Galvanized nails*	94	115
Woven wire fence†	100	123
Fence posts, carloads††	105	...
Single loop bale ties	99	123
Galvanized barbed wire**	113	133
Twisted barbless wire	113	...

* Also Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80-rod spools, in carloads. †† Pittsburgh, Duluth only.

	Base per 100 lb	San Francisco
Annealed fence wire ‡	$4.20	$5.21
Annealed, galv. fencing ‡	4.65	5.66
Cut nails, carloads ‡‡	6.30	...

‡ Add 10¢ at Worcester. ‡‡ Pittsburgh only, less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	5.30	5.30	5.30	5.30	5.30
Galvanized	....	6.00	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	....	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	47	29½
¼-in.	50	33½
1-in.	52½	36½
1¼-in.	53	37
1½-in.	53½	37½
2-in.	54	38
2½ and 3-in.	54½	38½
Wrought Iron, buttweld		
⅛-in.	+11	+35
¼-in.	+ 1½	+25
1 and 1¼-in.	4	+16½
1½-in.	9½	+13
2-in.	10	+12½
Steel, lapweld		
2-in.	44½	28
2½ and 3-in.	48½	32
3½ to 6-in.	50½	34
Steel, seamless		
2-in.	43½	+27
2½ and 3-in.	46½	30
3½ to 6-in.	48½	32
Wrought Iron, lapweld		
2-in.	1½	+20
2½ to 3½-in.	4	+16
4-in.	8	+10½
4½ to 8-in.	6	+12

Extra Strong, plain ends

Steel, buttweld		
½-in.	46	30
¾-in.	50	34
1-in.	52	37
1¼-in.	52½	37½
1½-in.	53	38
2-in.	53½	38½
2½ and 3-in.	54	39
Wrought Iron, buttweld		
½-in.	+ 6½	+29
¾-in.	+ ½	+23
1 and 1¼ in.	4	+16½
2-in.	10	+12½
Steel, lapweld		
2-in.	43½	28
2½ and 3-in.	48½	33
3½ to 6-in.	52	36½
Steel, seamless		
2-in.	42½	27
2½ and 3-in.	46½	31
3½ and 6-in.	50	34½
Wrought Iron, lapweld		
2-in.	4½	+16½
2½ to 4-in.	13	+ 6
4½ to 6-in.	9	+10½

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

	Electric Weld	
	Hot Rolled	Cold Drawn
2	$17.30	$20.36
2½	23.27	27.36
3	25.88	30.46
3½	32.35	38.08
4	40.16	47.24

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago $91.12
6-in. to 24-in. del'd New York 89.18
6-in. to 24-in., Birmingham 79.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less 105.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Percent Off List
½ in. & smaller x 6 in. & shorter	45
9/16 & ⅝ in. x 6 in. & shorter	46
¾ in. & larger x 6 in. & shorter	43
All diam, longer than 6 in.	41
Lag, all diam over 6 in. long	44
Lag, all diam x 6 in. & shorter	46
Plow bolts	54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	43
9/16 to 1 in. inclusive	42
1⅛ to 1½ in. inclusive	40
1⅝ in. and larger	35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller	..	46
½ in. and smaller	44	..
½ in. through 1 in.	..	44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in.	41	42
1⅝ in. and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate ..... 65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ *in. and larger*)

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets (7/16 *in. and smaller*)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	53
¾ to 1 in. x 6 in., SAE 1035, heat treated	44
Set screws, oval points	56
Milled studs	29
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDER

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28¼¢
Copper, electrolytic, 100 and 325 mesh	30⅝¢ to 34¼¢
Copper, reduced, 150 and 200 mesh	30½¢ to 32¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 17¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Domestic sponge iron, minus 48 mesh	10¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	6¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	44¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	39½¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 300 mesh, carlots	23¢ to 29¢
Antimony, 100 mesh	44¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200 & 300 mesh	20½¢ to 25½¢
Manganese, minus 325 mesh and coarser	85¢
Nickel, 100 mesh	51½¢
Silicon, 100 mesh	25¢
Solder powder, 100 mesh	8½¢ plus metal
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$12.00 to $13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	$18.60
Chicago, f.o.b.	17.50
New England, del'd	20.40
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, f.o.b.	17.75
Swedeland, Pa., f.o.b.	17.75
Buffalo, del'd	20.15
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	19.95
Cleveland, del'd	17.90
Cincinnati, del'd	18.59
St. Louis, del'd	18.03
Birmingham, del'd	15.76

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Carloads, Per 1000*
No. 1 Ohio	$67.00
First quality, Pa., Md., Ky., Mo., Ohio	73.00
First quality, New Jersey	78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio	67.00
Sec. quality, New Jersey	70.00
No. 2 Ohio	59.00
Ground fire clay, net ton, bulk	10.50
Silica Brick	
Pennsylvania and Birmingham	$73.00
Chicago District and Alabama	82.00
Silica cement, net ton (Eastern)	12.50
East Chicago	13.50
Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$64.00
Magnesite Brick	
Standard, Balt. and Chester	$86.00
Chemically bonded, Baltimore	75.00

Grain Magnesite
std. ⅜-in. grains

Domestic, f.o.b. Balt. and Chester in bulk, fines removed	$51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	27.00
in sacks with fines	31.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢; Missouri Valley, add 20¢ .. $11.06

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.51	$5.78	$5.91	$4.83	$5.73	$4.86	$4.57	$4.88	$5.58	$8.52	$8.67	$10.13	$10.28
New York	4.76	5.78[1]	6.16	5.09	6.07	5.11	4.80	5.08	5.63	8.58	8.73	10.18	10.33
Boston	4.83	5.69	6.23[12]	5.61	6.87	5.18	4.91	5.04	5.69	8.20	8.35	9.50	9.65
Baltimore	4.33	....	5.73	4.81	....	4.78	4.73	4.86	5.56	....	....	....	....
Norfolk	4.90	....	....	5.30	....	5.15	5.15	5.20	6.00	....	....	....	....
Chicago	4.25	5.10	5.85	4.35	5.45	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
Milwaukee	4.458	5.308	5.858	5.058	5.658	4.808	4.608	4.608	5.395	8.495	8.795	9.945	10.095
Cleveland	4.25	5.10[1]	5.81	4.55	....	4.60†	4.68	4.40	5.10	8.51	8.66	9.50	9.65
Buffalo	4.25	5.10	6.05	5.25	5.70[5]	5.00	4.40‡	4.40‡	5.10	8.20	8.35	9.50	9.65
Detroit	4.10	5.28	6.07	4.77	5.67	4.92†	4.82	4.56-4.82	5.28	8.82	8.97	10.09	10.24
Cincinnati	4.55	5.21	5.76	4.79	5.74	4.99	4.84	4.79	5.49	8.73	8.88	10.04	10.19
St. Louis	4.61	5.46	6.07	4.71	5.87	4.96	4.76	4.78	5.52	8.77	8.92	10.07	10.22
Pittsburgh	4.25	5.10[1]	5.85	4.35	....	4.60	4.40	4.40	5.10	8.20	8.37	9.50	9.65
St. Paul	4.68	5.53	6.08	4.78	....	5.03	4.83	4.83	6.00	....	....	....	....
Omaha	5.262	....	6.712	5.362	....	5.612	5.412	5.412	6.112	....	....	....	....
Indianapolis	4.59	5.36	5.91	4.89	5.79	4.94	....	4.74	5.44	....	....	....	....
Birmingham	4.45[11]	....	5.65	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.13	....	....	....	....
Memphis	4.88[11]	5.94[1]	6.43	5.08[11]	....	5.23[11]	5.03[11]	5.03[11]	5.94	....	....	....	....
New Orleans	*5.05[11]	6.39[1]	....	5.25[11]	....	5.40[11]	*5.10[11]	*5.20[11]	6.39[6]	....	....	....	....
Houston	5.75[9]	....	7.36	6.00[9]	....	5.85[9]	5.85[9]	5.35[17]	7.00	9.40	9.25	10.40	10.55
Los Angeles	5.75	7.35[1]	7.40	6.05	8.70[5]	5.55	5.35	5.50	7.35[14]	9.70[15]	9.55[10]	11.15[15]	11.30[15]
San Francisco	5.40[8]	6.65	7.05	5.75[8]	8.70	5.50	5.20	5.05	7.50	9.70[15]	9.55[15]	11.15[15]	11.30[15]
Seattle	5.45[4]	7.25[2]	6.85	5.60[4]	....	5.60[4]	5.25[4]	5.45[4]	7.45[14]	....	8.95[16]	....	11.30[15]
Portland	5.30[4]	7.10[2]	6.70	5.60[4]	....	5.45[4]	5.25[4]	5.55[4]	7.45[14]	....	....	....	....
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham

† Up to ¾ in. thick and 90 in. wide.

‡ Add 40¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	40.00	40.50	41.00	41.50	.....
Birmingham	38.88	38.38-39.38	.....	.....	.....
Buffalo	40.00-45.00*	40.00-45.50*	40.50 46.00*	.....	.....
Chicago	38.50	39.00	39.50	40.00	.....
Cleveland	38.50-39.75*	39.00-40.25*	39.50-40.75*	.....	.....
Duluth	39.00	39.50	40.00	40.50	.....
Erie	38.50	39.00	39.50	40.00	.....
Everett		45.00	45.50	.....	.....
Granite City	39.50	40.00	40.50	.....	.....
Neville Island	39.00	39.50	39.50	40.00	.....
Provo	39.00	39.50	.....	.....	.....
Sharpsville	39.00	39.50	39.50	40.00	.....
Steelton	40.00	.....	.....	.....	46.00
Struthers, Ohio	39.50	.....	.....	.....	.....
Swedeland	45.00	45.50	46.00	46.50	.....
Toledo	38.50	39.00	39.50	40.00	.....
Troy, N. Y.	.....	.....	.....	.....	46.00
Youngstown	39.00	39.50	39.50	40.00	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	.....
Boston	Steelton	5.78	45.78	.....	.....	.....	51.78
Brooklyn	Bethlehem	3.60	43.60	44.10	44.60	45.10	.....
Cincinnati	Birmingham	5.85	44.73	42.23-45.23	.....	.....	.....
Jersey City	Bethlehem	2.21	42.21	42.71	43.21	43.71	.....
Los Angeles	Provo	7.13	46.13	46.63	.....	.....	.....
Mansfield	Cleveland-Toledo	2.56	41.06-42.31*	41.56-42.81*	42.06 43.31*	42.56	.....
Philadelphia	Bethlehem	2.00	42.00	42.50	43.00	43.50	.....
Philadelphia	Swedeland	1.21	43.21	43.71	47.21	47.71	.....
Philadelphia	Steelton	2.59	42.59	.....	.....	.....	48.59
San Francisco	Provo	7.13	46.13	46.63	.....	.....	.....
Seattle	Provo	7.13	46.13	46.63	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25	.....	.....

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$49.50; f.o.b. Buffalo—$50.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $62.46. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	189.00
Delivered Pittsburgh	151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$46.00	$47.00
F.o.b. Pittsburgh	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn.	23.00	24.85	26.05
0.10% max. C.	22.50	24.35	25.55
0.15% max. C.	22.00	23.85	25.05
0.30% max. C.	21.50	23.35	24.55
0.50% max. C.	21.00	22.85	24.05
0.75% max. C., 7.00% max. Si.	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk	7.80
Ton lots	9.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe.	16.90	17.50	18.10
97% Si, 1% Fe.	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75
65-69% Cr, 4.9% C	18.60	19.00	19.15
62-66% Cr. 4-6% C. 6-9% Si.	18.60	19.00	19.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

	Eastern	Central	Western
0.20% max. C.	97.00	98.50	99.75
0.50% max. C.	93.00	94.50	95.75
9.00% min. C.	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone: 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70 $3.40
Less ton lots	2.20	3.05 4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-500% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.35
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2	$1.30
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.21
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	18.40¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	6.00¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	6.90¢
Ton lots	7.40¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.50¢
Ton lots	10.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max Si, 0.50% max. Al, 0.50% max. C.

Eastern	Central	Western
$1.20	$1.23	$1.21

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$1.80	$1.8125	$1.8445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	39.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	93¢
No. 6	63¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.

Ton lots, per pound	3.0¢

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B | $6.35